



**ICESat (GLAS) Science Processing Software Document Series**

**The GLAS Standard Data Products Specification—  
Data Dictionary, Version 1.0**

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# Foreword

The GEOSCIENCE LASER ALTIMETER SYSTEM (GLAS) is the primary instrument for the ICESat (Ice, Cloud and Land Elevation Satellite) laser altimetry mission. ICESat is the benchmark Earth Observing System (EOS) mission for measuring ice sheet mass balance, cloud and aerosol heights, as well as land topography and vegetation characteristics. From 2003 to 2009, the ICESat mission provided multi-year elevation data needed to determine ice sheet mass balance as well as cloud property information, especially for stratospheric clouds common over polar areas. It also provided topography and vegetation data around the globe, in addition to the polar-specific coverage over the Greenland and Antarctic ice sheets.

This document contains the data dictionary for the GLAS standard data products. This Standard Data Products Specification is developed under the structure of the NASA STD-2100-91, a NASA standard defining a four-volume set of documents to cover an entire software life cycle. Under this standard a section of any volume may, if necessary, be rolled out to its own separate document. This document is a roll out of the GLAS ESDIS Software Detailed Design Specification under the Product Specification Volume.

This document details the parameters present on GLAS standard data products. The term “standard data products” refers to those EOS instrument data products listed in the Earth Science Data and Information System (ESDIS) Project data base that are routinely generated within the EOSDIS Distributed Active Archive Center (DAAC) or Science Computing Facilities (SCFs). Each data product has a unique Product Identification code assigned by the Senior Project Scientist.

This document was prepared under auspices of the Cryospheric Sciences Laboratory at NASA Goddard Space Flight Center, in support of B. E. Schutz, GLAS Science Team Leader for the GLAS Investigation. This work was performed under the direction of David W. Hancock, III, who may be contacted at (757) 824-1238, David.W.Hancock@nasa.gov (e-mail), or (757) 824-1036 (FAX).

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## Section 1

# Introduction

### 1.1 Identification of Document

This document is identified as the GLAS Standard Data Products Specification - Data Dictionary (SDPS-DD). The unique document identification number within the GLAS Standard Data Software documentation numbering scheme is designated on the cover page. This edition marks the first and final release of this document. Information contained within this document was formerly contained in appendices of the GLAS Standard Data Products Specification Level 1 (SDPS-L1) and Level 2 (SDPS-L2) documents.

### 1.2 Scope of Document

This document describes parameters contained with the GLAS Standard Data Products. The intended audience for this document is the GLAS Science and Instrument Teams, the ESDIS Project and related focus teams, the community of data users and investigators, and the GSAS Development Team.

### 1.3 Purpose and Objectives of Document

The purpose of the GLAS Standard Data Products Specification - Data Dictionary is to provide a detailed description of the parameters contained with the GLAS Standard Data Products.

### 1.4 Document Organization

This document's outline is assembled in a form similar to those presented in the NASA Software Engineering Program [Information Document 2.3a].

### 1.5 Document Status and Schedule

This document is the first and final version of the GLAS Standard Data Products Specification - Data Dictionary.

### 1.5.1 Document Change History

Document Name: GLAS Standard Data Products Data Dictionary		
Version Number	Date	Nature of Change
Version 1.0	August 2012	Original Version. Final Release.



## Related Documentation

### 2.1 Parent Documents

The GLAS Level 1 Standard Data Products Specification - Data Dictionary is considered a “roll-out” from the Product Specification as the parent document or volume. Specific topics pertaining to data descriptions are located in the External Interface section under the Detailed Design document template.

This document is subordinate to any top-level mission or instrument management plan documents, and as such, recognizes these documents as external parent documents in lineage. The recognized external EOSDIS and GLAS parent documents superior to this document are listed below.

- a) *NASA Earth Observing System Geoscience Laser Altimeter System GLAS Science Requirements Document*, Version 2.01, October 1997, Center for Space Research, University of Texas at Austin.
- b) *GLAS Science Software Management Plan*, NASA/TM-1999-208641/Version 3/Volume 1, August 1998, NASA/GSFC Wallops Flight Facility.

### 2.2 Applicable Documents

The following documents are related to, or contain policies or references pertinent to the contents of this document.

- a) *The Algorithm Theoretical Basis Document for Level 1A Processing*, NASA/TM-2012-208641 / Volume 5, June 2012, NASA Goddard Space Flight Center, et al.
- b) *The Algorithm Theoretical Basis Document for the GLAS Atmospheric Data Products*, NASA/TM-2012-208641 / Volume 6, July 2012, NASA Goddard Space Flight Center, et al.
- c) *The Algorithm Theoretical Basis Document for the Derivation of Range and Range Distributions from Laser Pulse Waveform Analysis for Surface Elevations, Roughness, Slope, and Vegetation Heights*, NASA/TM-2012-208641/Volume 7, August 2012, NASA Goddard Space Flight Center, et al.
- d) *The Algorithm Theoretical Basis Document for the Atmospheric Delay Correction to GLAS Laser Altimeter Ranges*, NASA/TM-2012-208641/Volume 8, NASA Goddard Space Flight Center, et al.
- e) *The Algorithm Theoretical Basis Document for Tidal Corrections*, NASA/TM-2012-208641/Volume 9, Scripps Institution for Oceanography, et al.
- f) *The Algorithm Theoretical Basis Document for Precision Orbit Determination*, 2012, University of Texas Center for Space Research, et al.
- g) *The Algorithm Theoretical Basis Document for Precision Attitude Determination*, 2012, University of Texas Center for Space Research, et al.

- h) *The Algorithm Theoretical Basis Document for Laser Footprint Location (Geolocation) and Surface Profiles*, 2012, University of Texas Center for Space Research, et al.
- i) *GLAS Standard Data Products Specification - Level 1*, NASA/TM-2013-208641/Volume 13, NASA Goddard Space Flight Center, et al.
- j) *GLAS Standard Data Products Specification - Level 2*, NASA/TM-2013-208641/Volume 14, NASA Goddard Space Flight Center, et al.
- k) *GSAS Detailed Design Document*, NASA/TM-2013-208641/Volume 16, NASA Goddard Space Flight Center, et al.
- l) *GSAS User's Guide*, NASA/TM-2013-208641/Volume 17, NASA Goddard Space Flight Center, et al.

## 2.3 Information Documents

The following documents are provided as sources of information that provide background or supplemental information that may clarify or amplify material in this document.

- a) *NASA Software Documentation Standard Software Engineering Program*, NASA-STD-21000-91, July 29, 1991, NASA.
- b) *The Geoscience Laser Altimetry/Ranging System*, IEEE Transactions on Geoscience and Remote Sensing, Vol. GE-25, No. 5, September 1987.
- c) *EOS Altimetry/GLAS Phase-A Study*, November 1995, NASA Goddard Space Flight Center.
- d) *Memorandum: GLAS Data Products*, Center for Space Research, December 23, 1993, University of Texas at Austin.
- e) *GLAS Science Computing Facility (SCF) Plan*, October 1997, NASA/GSFC Wallops Flight Facility.

## Section 3

# Standard Label Contents & Description

GLAS Products begin with ASCII header records containing information regarding the processing which created the product and the data contained within. These header records are exactly the same size as a product data record and contain ASCII information in a slightly modified KEYWORD=VALUE format. In order to conserve space on the product, the header records contain multiple KEYWORD=VALUE entries and entries are delimited by a semi-colon (;) and linefeed (ASCII 10).

By design, the first two header entries are the record length and number of header records. This allows product reader code to verify the record length and jump directly to the first data record, if necessary. Most of the remaining information within the headers is directly applicable to the generation of metadata files for EOS ingest.

The following fields are defined for GLAS Product Headers:

**Table 3-1 Product Header Elements**

Keyword	Content Description
Additional_Attribute	Product-specific additional attributes.
AutomaticQualityFlagExplan	Automatic Quality flag explanation (per parameter).
Cycle	A count of the number of exact repeats of this reference orbit.
EquatorCrossingDate	Date of the equator crossing.
EquatorCrossingLong	Longitude of equator crossing.
EquatorCrossingTime	Time of the equator crossing.
glas_osc_rate	Value that indicates the accuracy rate of the GLAS oscillator.
glas_osc_rate_date	Valid date of the GLAS oscillator rate. (yyyy-mm-dd)
glas_osc_rate_time	Valid time of the GLAS oscillator rate. (hh:mm:ss)
InputPointer	Name of each input product file used to created this product (one instances of this keyword appears in the product header record for each input product file used in creation of this product).
internal_range_delay	Internal range delay for digitizer in meters (from anc33).
internal_range_delay_date	Valid date of corresponding internal range delay. (yyyy-mm-dd)
internal_range_delay_time	Valid time of corresponding internal range delay. (hh:mm:ss)
internal_time_delay	Time delay for digitizer in seconds (from anc33).
internal_time_delay_date	Valid date of internal time delay. (yyyy-mm-dd)
internal_time_delay_time	Valid time of internal time delay. (hh:mm:ss)
Instance	The number of times that a specific reference orbit has been returned to during flight.

**Table 3-1 Product Header Elements (Continued)**

<b>Keyword</b>	<b>Content Description</b>
instrument_short_name	Short name of instrument (GLAS).
Instrument_State	Flag word that indicates which redundant units (laser, detector, oscillator) of the GLAS instrument are in operation.
Instrument_State_Date	The date that corresponds to the Instrument_State. There are a maximum of two per granule.
Instrument_State_Time	The time that corresponds to the Instrument_State. There are a maximum of two per granule.
LocalGranuleID	Filename of the granule.
LocalVersionID	Granule version number (auto-incrementing, nn in filename convention).
Numhead	Number of header records preceeding product data records.
OperationalQualityFlagExpl	Operational Quality flag explanation (per parameter).
Orbit Number	Orbit number
OrbitQuality	Status word that states what type of orbit was used during processing of the data for the granule. It specifies the models used in the orbit determination program. This provides an indication of the quality of the orbits being applied to the data.
ParameterName	Name of product specific parameters for which additional information follows.
PercentFullRate	Percent of data for this granule that atmospheric parameters are provided at 40 Hz data rate.
PercentGroundHit	Percent of data for this granule that had a detected ground return of the transmitted laser pulse.
PercentHighRate	Percent of data for this granule that atmospheric parameters are provided at 5 Hz data rate.
PercentLowRate	Percent of data for this granule that atmospheric parameters are provided at 0.25 Hz data rate.
PercentMediumRate	Percent of data for this granule that atmospheric parameters are provided at 1 Hz data rate.
Percent1064to532	Percent atmospheric profiles that use the 1064 nm profile data to provide estimated values for the saturated 532nm profiles.
PGEVersion	Version number of the GSAS software that generated this granule.
platform_short_name	Short name of spacecraft (Icesat).
ProductionDateTime	Creation time of granule.
QAPercentMissingData	Percent of missing data (per parameter)
QAPercentOutofBounds	Percent of out-of-bounds data (per parameter)
RangeBeginningDate	Start date of data on the granule.

**Table 3-1 Product Header Elements (Continued)**

<b>Keyword</b>	<b>Content Description</b>
RangeEndingDate	End data of data on the granule.
RangeBeginningTime	Start time of day for data on this granule.
Range_Bias	The additive calibration correction in millimeters to apply to range based on the science team cal/val activities.
Range_Bias_Date	The date that corresponds to the first valid Range_Bias. There are a maximum of two per granule.
Range_Bias_Time	The time that corresponds to the first valid Range_Bias. There are a maximum of two per granule.
RangeEndingTime	End time of day for data on this granule.
Recl	Record length in bytes.
ReferenceOrbit	Assigned number for which exact orbital elements describe the exact repeat orbit pattern.
ReprocessingPlanned	Planned reprocessing status.
ReprocessingActual	Actual reprocessing status.
sc_osc_rate	Value that indicates the accuracy of the spacecraft oscillator.
sc_osc_rate_date	Valid date of the spacecraft oscillator measurement. (yyyy-mm-dd)
sc_osc_rate_time	Valid time of the spacecraft oscillator measurement. (hh:mm:ss)
sensor_short_name	Short name of sensor (LaserALT).
ScienceQualityFlagExplana	Science Quality flag explanation (per parameter).
ShortName	GSAS Filetype.
size_mb_ecs_data_granule	Size (in MB) of the granule.
SP_ICE_GLAS_EndBlock	Integer SPICE block number within GLAS coverage scheme in which granule data ends.
SP_ICE_PATH_NO	Number which represents the GLAS SPICE path number.
SP_ICE_GLAS_StartBlock	Integer SPICE block number within GLAS coverage scheme in which granule data starts.
time_between_contiguous_records	Time between contiguous data records (in seconds).
Timing_Bias	The time tag error determined by the calibration team that was added to the time tags to compute the true time of data as provided on the granule.
Timing_Bias_Date	The date that corresponds to the Timing_Bias. There are a maximum of two per granule.
Timing_Bias_Time	The time of day that corresponds to the Timing_Bias. There are a maximum of two per granule.
Timing_Drift	This is the ratio of the true time for a one second oscillator tick to nominal one.

**Table 3-1 Product Header Elements (Continued)**

Keyword	Content Description
Timing_Drift_Date	The date that corresponds to the Timing_Drift. There are a maximum of two per granule.
Timing_Drift_Time	The time of day that corresponds to the Timing_Drift. There are a maximum of two per granule.
Track	The unique number assigned for each repeat ground track (one orbit) of the reference orbit.
Track_Segment	Number assigned for the specific latitude segment (1 = +50 to +50, 2 = +50 to -50, 3 = -50 to -50, 4 = -50 to +50) of the track for the data.
VersionID	The ESDT version number that is to be used with this product.
<i>Additional product specific information</i>	(see Table 3-2)

In addition to the common information contained in its headers, each product may also contain information specific to the type of data it contains. This type of information is called a product-specific attribute (PSA). The PSAs mostly contain information related to product data quality. The PSAs and their attributes are listed in Table 3-2.

**Table 3-2 Product Specific Elements**

Product	Parameter Name	Attribute Name	Attribute
GLA01	Range	AutomaticQualityFlag	Flag will fail if percent no range > N% or percent missing > M% or percent out of bounds > B% where N, M, B are TBD.
		QAPercentMissingData	Percent Missing is the number of either (APID 12+13) or (APID 19).
		QAPercentOutofBounds	Percent Out of Bounds is percent of time EchoPeak-Loc = 0 for shots w/ APID 19 AND (12 or 13) present.
GLA02	PC_Profile	AutomaticQualityFlag	Flag will fail if PCProfile_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is percent missing either (APID 15) or (APID 19).
GLA02	CD_Profile	AutomaticQualityFlag	Flag will fail if CDProfile_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is missing either (APID 17) or (APID 19).

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA03	Data	AutomaticQualityFlag	Flag will fail if Data_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is percent missing 16 second frames using requested granule times.
GLA03	Temperature	AutomaticQualityFlag	Flag will fail if any temperature is out of bounds.
		QAPercentOutofBounds	Percent Out of Bounds is % of temperature parameters that are out of bounds. Use Red Limits.
GLA03	Voltage	AutomaticQualityFlag	Flag will fail if any voltage is out of bounds.
		QAPercentOutofBounds	Percent Out of Bounds is percent of voltage parameters that are out of bounds. Use Red Limits.
GLA04	prap	AutomaticQualityFlag	Flag will fail if PRAP_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing APID 1984.
GLA04	Gyro	AutomaticQualityFlag	Flag will fail if Gyro_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing in appropriate APID.
GLA04	Laser Reference System	AutomaticQualityFlag	Flag will fail if LRS_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing in appropriate APID.
GLA04	Star Tracker	AutomaticQualityFlag	Flag will fail if BST_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing in appropriate APID.
GLA04	Laser Pulse Array	AutomaticQualityFlag	Flag will fail if LPA_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing APID 26.

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA04	Instrument Star Tracker	AutomaticQualityFlag	Flag will fail if IST_PctMissing > 5%.
		QAPercentMissingData	Percent Missing is % missing in appropriate APID.
GLA05	Range	AutomaticQualityFlag	Flag will fail if % no range > 25% or percent missing > 5% or percent out of bounds > 15%. Percent no range = percent missing + percent out of bounds - percent out of bounds * percent missing / 100.
		QAPercentMissingData	Percent Missing is (Expected - Received) / Expected. Expected from start/stop times on INPUT_FILE line.
		QAPercentOutofBounds	Percent Out of Bounds is percent of received with entire signal below threshold.
GLA06	Surface Elevation	AutomaticQualityFlag	Flag will fail if percent no elevation > 25% or percent missing > 5% or percent out of bounds > 15%. Percent no elevation = percent missing + percent out of bounds - percent out of bounds * percent missing / 100.
		QAPercentMissingData	Percent Missing is (Expected - Received) / Expected.
		QAPercentOutofBounds	Percent Out of Bounds is number of invalid / number of shots received.
GLA06	Surface Roughness	AutomaticQualityFlag	Flag will fail if SurfRoughness_PctOOB > 5%.
		QAPercentOutofBounds	Percent Out of Bounds is number of Invalid / number of shots received.



**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA06	Surface Reflectance	AutomaticQualityFlag	Flag will fail if SurfReflectance_PctOOB > 5%.
		QAPercentOutofBounds	Percent Out of Bounds is number of invalid / number of shots received.
GLA06	Surface Slope	AutomaticQualityFlag	Flag will fail if SurfSlope_PctOOB > 5%.
		QAPercentOutofBounds	Percent Out of Bounds is number of invalid / number of shots received.
GLA07	532nm Attenuated Back-scatter	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA07	1064nm Attenuated Back-scatter	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA08	Aerosol Layer Heights	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA08	Planetary Boundary Layer	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA09	Cloud Layer Heights	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA10	Cloud Backscatter Cross Section Profile	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA10	Cloud Extinction Cross Section Profile	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA10	Aerosol Backscatter Cross Section Profile	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA10	Aerosol Extinction Cross Section Profile	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA11	Cloud Optical Depth	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA11	Aerosol Optical Depth	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA11	Planetary Boundary Layer Optical Depth	AutomaticQualityFlag	Flag, will fail if the parameter percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA12	Surface Elevation	AutomaticQualityFlag	Flag, will fail if surface elevation percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA12	Surface Roughness	AutomaticQualityFlag	Flag, will fail if surface roughness percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA12	Surface Reflectance	AutomaticQualityFlag	Flag, will fail if surface reflectance percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out if Bounds is the number of invalid divided by number of shots received.
GLA12	Surface Slope	AutomaticQualityFlag	Flag, will fail of surface slope percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA13	Surface Elevation	AutomaticQualityFlag	Flag, will fail if surface elevation percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA13	Surface Roughness	AutomaticQualityFlag	Flag, will fail if surface roughness percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA13	Surface Reflectance	AutomaticQualityFlag	Flag, will fail if surface reflectance percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA14	Surface Elevation	AutomaticQualityFlag	Flag, will fail if surface elevation percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA14	Surface Roughness	AutomaticQualityFlag	Flag, will fail if surface roughness percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA14	Surface Reflectance	AutomaticQualityFlag	Flag, will fail if surface reflectance percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.

**Table 3-2 Product Specific Elements (Continued)**

Product	Parameter Name	Attribute Name	Attribute
GLA14	Surface Slope	AutomaticQualityFlag	Flag, will fail if surface slope percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA15	Surface Elevation	AutomaticQualityFlag	Flag, will fail if surface elevation percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA15	Surface Roughness	AutomaticQualityFlag	Flag, will fail if surface roughness percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.
GLA15	Surface Reflectance	AutomaticQualityFlag	Flag, will fail if surface reflectance percent out of bounds is greater than 5%.
		QAPercentOutofBounds	Percent Out of Bounds is the number of invalid divided by number of shots received.



## Section 4

# Data Dictionary

### 4.1 Description of the Data Dictionary

Detailed parameter descriptions are provided in this section. These descriptions provide details for each parameter within a product file. Table 4-1 lists the fields shown in each detailed data dictionary description.

Table 4-1 GLAS Data Dictionary

Field	Description
Product Var Name	Unique identifying name of the product variable.
Is element of:	Corresponding record where variable is located.
Short Description	Descriptive name of the product variable.
Prod Data Type	Product (Unscaled) Variable Type and dimensions (in parens).  <b>i1b</b> = Integer, 1 byte <b>i2b</b> = Integer, 2 bytes <b>i4b</b> = Integer, 4 bytes <b>r4b</b> = Real, 4 bytes <b>r8b</b> = Real, 8 bytes etc...
Total Bytes	Total number of bytes used by variable.
Product Units	Units in which variable is stored on product file.
Total Bytes	Total number of bytes used by variable.
Product Units	Units in which variable is stored on product file.
Invalid Value/Flag	Indicates what identifies the filed as being invalid.  <b>None</b> = variable cannot be invalid. <b>gd_invalid_xxx</b> = datatype-specific value which indicates the variable is not valid. <b>[variable name]</b> = name of the flag to check in order to determine validity of the variable.
Is Correction Flag	Flag indicating if the variable is a correction flag.
Is Unsigned?	Flag indicating if variable should be treated as unsigned.
Product Minimum	Minimum value supported in product variable.
Product Maximum	Maximum value supported in product variable.
Description	Text description.
Comments	Text comments.

## 4.2 Data Dictionary

Product Var Name `i_rec_ndx`

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: `i4b`

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name `i_UTCTime`

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: `i4b (2)`

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name `i_gla01_rectype`

Is element of: GLA01 Main Record

Short Description: GLA01 Record Type

Product Data Type: `i2b`



Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2

Description: Record type indicating whether this record is a invalid = 0, main=1, long=2, or short=3 waveform record.

Comments:

Product Var Name i\_spare1

Is element of: GLA01 Main Record

Short Description: Spares 1

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA01 spare1.

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_i1\_pred\_lat

Is element of: GLA01 Main Record, GLA02 Record

Short Description: Predicted geodetic Latitude of the laser footprint

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic Latitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.

Comments:

Product Var Name i1\_pred\_lon

Is element of: GLA01 Main Record, GLA02 Record

Short Description: Predicted geodetic Longitude of the laser footprint

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The geodetic Longitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.

Comments:

Product Var Name i\_RespEndTime

Is element of: GLA01 Main Record

Short Description: Ending Address of Range Response

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5100000

Description: Address (in digitizer counts) of the 2000-byte surface echo data dump (as measured from the start of Acquisition Memory, i.e. Start of digitization). Last in time. From APID12/13 offset 80.

Comments:

Product Var Name i\_LastThrXingT

Is element of: GLA01 Main Record

Short Description: Last Threshold Crossing Location for Selected Filter

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5100000

Description: Address, in digitizer counts, of the detected last (i.e. last in time) threshold crossing (as measured from the start of Acquisition Memory, i.e. Start of digitization). Also called the trailing edge. Set to 0 if threshold crossing was NOT detected. From APID12/13, Offset 84.

Comments: null

Product Var Name i\_NextThrXing

Is element of: GLA01 Main Record

Short Description: Next to Last Threshold Crossing Location for Selected Filter

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5100000

Description: Address (in digitizer counts) of the detected next to last threshold crossing (as measured from the start of Acquisition Memory, i.e. Start of digitization). Also called the leading edge. Set to 0 if a threshold crossing was NOT detected. From APID12/13 offset 88.

Comments:

Product Var Name i\_EchoPeakLoc

Is element of: GLA01 Main Record

Short Description: Echo Peak Location

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5100000

Description: Address (in digitizer counts) of the detected peak value (as measured from the start of Acquisition Memory, i.e. Start of digitization). Set to 0 if a threshold crossing was NOT detected. From APID12/13 offset 100.

Comments:

Product Var Name i\_EchoPeakVal

Is element of: GLA01 Main Record

Short Description: Echo Peak Value

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Peak value for the selected filter returned by the FIR filter engine. Set to 0 if a threshold crossing was not detected. From APID12/13 offset 96.

Comments:

Product Var Name i\_wt\_fact\_filt

Is element of: GLA01 Main Record

Short Description: Filter Weight Factors

Product Data Type: i4b (6, 40)

Total Bytes: 960

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2000000000

Description: Results of weight formulas for all FIR filters. There are a total of 6 filters. From APID12/13, offset 124.

Comments:

Product Var Name i\_filt\_thresh

Is element of: GLA01 Main Record

Short Description: Selected Filter Threshold Value

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Threshold values used to find the last and next to last threshold crossings for the selected filter. From APID12/13, Offset 108.

Comments:

Product Var Name i\_time\_txWfPk

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Transmit Pulse Peak Location

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 500000

Description: Address in digitizer counts of the Transmit Pulse Peak as measured from the start of Acquisition Memory, i.e. start of digitization. From APID12/13, Offset 68.

Comments: The range measurement starts from this time. To accurately time stamp the transmit pulse, it is necessary to add the delay to start of digitizer.

Product Var Name i\_TxWfStart

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Starting Address of Transmit Pulse Sample

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 500000

Description: Starting Address in digitizer counts of the Transmit Pulse sample relative to the start of digitization. From APID12/13, Offset 76.

Comments:

Product Var Name i\_TxNrg\_EU

Is element of: GLA01 Main Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i4b

Total Bytes: 4

Product Units: microjoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 90000

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name i\_RecNrgAll\_EU

Is element of: GLA01 Main Record

Short Description: 1064 Laser received Energy from all signal above threshold

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: attojoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200000

Description: This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing.

Comments:

Product Var Name i\_RecNrgLast\_EU

Is element of: GLA01 Main Record

Short Description: 1064 nm Laser Received Energy (max pk)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: attojoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200000

Description: This is the energy in the 1064 nm laser pulse between the threshold crossings before and after the maximum amplitude in energy units.

Comments:

Product Var Name i\_txWfPk\_Flag

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Transmit Waveform Peak Status Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 8

Description: Transmit\_Peak\_Status. Status Word: Bit 0: If bit is set to 1 (true), then internal software failure. Bit 1: If bit is set to 1 (true), then peak is below threshold. Bit 2: If bit is set to 1 (true), peak was not found. Note: once set to true, Bit 2 is latched and is only cleared by a DSP board reset or by a ground command. From APID12/13, Offset 72. Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_InstState

Is element of: GLA01 Main Record

Short Description: Instrument State

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 524288

Description: Flag defining current configuration of the GLAS instrument. This is a common flag. Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_FiltNumMask

Is element of: GLA01 Main Record

Short Description: Filter Selection Mask

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 64

Description: The low order 6 bits, bits 0 through 5, indicate which filters were selectable for a shot. The definition of complete failure of the filters has been changed to mean the complete failure of all SELECTABLE filters. Bit 0: 4 nsec filter, bit 1: 8 nsec filter, bit 2: 16 nsec filter, bit 3: 32 nsec filter, bit 4: 64 nsec filter, bit 5: 128 nsec filter. In case of the complete failure of all the filters, the result of the last 'good' shot shall be used, even if this mask prescribes the filter choice. A bit value = 1 =selectable; bit value = 0 = not selectable. From APID19, Offset 30.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_HOff

Is element of: GLA01 Main Record

Short Description: DEM Offset

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: Millimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1.0D9



Product Maximum: 1.0D9

Description: Offsets associated with the minimum and maximum height uploaded in the DEM used to define the range window. 1st item: minimum height offset = DEM uncertainty + bias; default is 1.125 km. 2nd item: maximum height offset = DEM uncertainty - bias; default is -0.875 km. From APID19, Offset 1116.

Comments:

Product Var Name i\_ADBias

Is element of: GLA01 Main Record

Short Description: Altimeter Digitizer Bias

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: Meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: Altimeter Digitizer bias values added to minimum and maximum range: 1st item is bias for minimum range (Rbmin) - default = 0; 2nd item is bias for maximum range (Rbmax) - default = 0. Used when necessary to correct for off-nadir pointing angles greater than 1 degree. From APID19, Offset 1124.

Comments:

Product Var Name i\_RminRmax

Is element of: GLA01 Main Record

Short Description: Range Window Start and Stop

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: Meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Range window start and stop in kilometers. From APID19, Offset 1100.

Comments:

Product Var Name i\_WMinMax

Is element of: GLA01 Main Record

Short Description: Window Size

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: Meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Range window minimum and maximum size. 1st item is minimum - default is 2 km; 2nd item is maximum - default is 11 km. From APID19, Offset 1108.

Comments:

Product Var Name i\_ObSCHt

Is element of: GLA01 Main Record

Short Description: On-board Height of S/C

Product Data Type: i4b

Total Bytes: 4

Product Units: Millimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1.0D9

Product Maximum: 1.0D9

Description: Geodetic altitude of S/C above earth surface (Hsat). From APID19, Offset 1092.

Comments:

Product Var Name i\_engineering

Is element of: GLA01 Main Record

Short Description: Engineering Data

Product Data Type: i2b (12)

Total Bytes: 24

Product Units: various

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -3000

Product Maximum: 5000

Description: The following is from /glas/vob/src/l1a\_lib/L\_EngCorr\_mod.f90 which is called by L1AMgr:

d\_engineering(1) = active detector temperature [T\_detID

if detector=1, T\_detID = GLA00\_prod%CTHW3\_hk(1)%i\_PRTad1C24\_t

if detector=2, T\_detID = GLA00\_prod%CTHW3\_hk(1)%i\_PRTad2C25\_t]

d\_engineering(2) = active digitizer temperature [T\_digID

if digitizer=1, T\_digID = GLA00\_prod%CTHW3\_hk(1)%i\_AD1ADCC19\_t

if digitizer=2, T\_digID = GLA00\_prod%CTHW3\_hk(1)%i\_AD2ADCC20\_t]

d\_engineering(3) = oscillator board temperature

[T\_relay = GLA00\_prod%CTHW3\_hk(1)%i\_OscBdC11\_t]

d\_engineering(4) = Fiber Box temperature

[T\_fb = GLA00\_prod%CTHW3\_hk(1)%i\_PRTfboxC29\_t]

d\_engineering(5) thru d\_engineering(12) TBD. All temperatures are in Celsius X 100.

Comments: Engineering data (temperatures, voltages, currents) affecting the altimetry data. Array of 12 values.

Product Var Name i\_compRatio

Is element of: GLA01 Main Record, GLA05 record

Short Description: Compression Ratios

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 5

Description: Averaging values p and q for frame. First item is p; second is q. From APID19, Offset 232. First N downlink samples are generated by averaging p raw digitized elements and the rest of the allocated samples in the waveform by averaging q elements.

Comments: Not valid if APID19 is missing.

Product Var Name i\_N\_val

Is element of: GLA01 Main Record, GLA05 record

Short Description: Value of N

Product Data Type: i2b

Total Bytes: 2

Product Units: gates

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 544

Description: Value of N used for waveform compression for the frame. From APID19, Offset 236.

Comments: Not valid if APID19 is missing.

Product Var Name i\_r\_val

Is element of: GLA01 Main Record, GLA05 record

Short Description: Value of r

Product Data Type: i2b

Total Bytes: 2

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 8

Description: Value of r used for waveform compression for frame. From APID19, Offset 238. Not valid if APID19 is missing.

Comments: After M shots with no valid return, the 'p' and 'q' averaging of the normal downlinked waveform compression type will be overridden and instead the telemetered received echo will consist of average samples averaged over 'r' raw samples.

Product Var Name i\_ADdetOutGn

Is element of: GLA01 Main Record

Short Description: Transmitted Gain

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: AD Detector Return Gain readback

Comments: This is only updated every 4 seconds.

Product Var Name i\_DEMmin

Is element of: GLA01 Main Record

Short Description: DEM minimum

Product Data Type: i2b

Total Bytes: 2

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 12000

Description: Onboard spacecraft DEM minimum elevation used to calculate hmin. From APID19, Offset 1192.

Comments:

Product Var Name i\_DEMmax

Is element of: GLA01 Main Record

Short Description: DEM maximum

Product Data Type: i2b

Total Bytes: 2

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 12000

Description: Onboard spacecraft DEM maximum elevation used to calculate hmax. From APID19, Offset 1193.

Comments:

Product Var Name i\_tx\_wf

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Sampled Transmit Pulse Waveform

Product Data Type: i1b (48, 40)

Total Bytes: 1920

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Transmit Pulse; 48 bytes of raw data samples.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc. Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_EchoLandType

Is element of: GLA01 Main Record

Short Description: Echo Land Type

Product Data Type: i1b

Total Bytes: 1

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Surface Echo Land Type for Compression. 0=sea, 1=land, 2=sea/ice, 3=land/ice. From APID19, Offset 231.

Comments: The long and short values and values of 'p', 'q', and 'N' are surface echo land type dependent, but can only change once per frame (1sec).

Product Var Name i\_RngSrc\_Flag

Is element of: GLA01 Main Record

Short Description: Range Data Source

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2

Description: Source of Range data: 0 = s/c time and position packet; 1 = uplinked DEM bytes; 2 = uplinked Rmin/Rmax. Please see the PDF flag description in the next section for more details. From APID19, Offset 1194.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_TxFlg

Is element of: GLA01 Main Record

Short Description: Transmit Pulse Flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the transmit pulse is telemetered (valid) or not telemetered (invalid) in this record (1 bit set/shot). See the PDF flag description in the next section for more information.

Comments:

Product Var Name i\_GainShiftFlg

Is element of: GLA01 Main Record

Short Description: Gain Shift Flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicates if the gain has been shifted for the corresponding measurement. 0=Gain has been shifted (valid) or 1=Gain has not been shifted (potentially invalid) in this record (1 bit set/shot). See the PDF flag description in the next section for more information.

Comments:

Product Var Name i\_spare2

Is element of: GLA01 Main Record

Short Description: Spare 2

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA01 spare2.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_gla01\_rectype

Is element of: GLA01 Long Waveform Record

Short Description: GLA01 Record Type

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2

Description: Record type indicating whether this record is a invalid=0, main=1, long=2, or short=3 waveform record.

Comments:

Product Var Name i\_spare1

Is element of: GLA01 Long Waveform Record

Short Description: Spares 1

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_filtnum

Is element of: GLA01 Long Waveform Record

Short Description: Filter Number

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5

Description: Filter with the highest weight (0 for 4 nsec filter; 1 for 8 nsec filter; 2 for 16 nsec filter; 3 for 32 nsec filter; 4 for 64 nsec filter; 5 for 128 nsec filter). May or may not be selectable! If no selectable filter can be chosen, then the last successful filter, selectable or NOT is chosen. From APID12/13, Offset 104.

Comments:

Product Var Name i\_shot\_ctr

Is element of: GLA01 Long Waveform Record

Short Description: Shot Counter

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: The shot number for each of the 40 shots in this record. The shot count rolls over after reaching 200. From APID12/13, Offset 16.

Comments:

Product Var Name i\_statflags

Is element of: GLA01 Long Waveform Record

Short Description: Range Window Status Word

Product Data Type: i4b (8)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 262144

Description: Range Window Status word: Bit 0: No first crossing found on 4-nsec filter Bit 1: No first crossing found on 8-nsec filter Bit 2: No first crossing found on 16-nsec filter Bit 3: No first crossing found on 32-nsec filter Bit 4: No first crossing found on 64-nsec filter Bit 5: No first crossing found on 128-nsec filter Bit 6: No second

crossing found on 4-nsec filter Bit 7: No second crossing found on 8-nsec filter Bit 8: No second crossing found on 6-nsec filter Bit 9: No second crossing found on 32-nsec filter Bit 10: No second crossing found on 64-nsec filter Bit 11: No second crossing found on 128-nsec filter Bit 12: First sample in range greater than or equal to threshold for 4 nsec filter Bit 13: First sample in range  $\geq$  to threshold for 8 nsec filter Bit 14: First sample in range  $\geq$  threshold for 16 nsec filter Bit 15: First sample in range  $\geq$  threshold for 32 nsec filter Bit 16: First sample in range  $\geq$  threshold for 64 nsec filter Bit 17: First sample in range  $\geq$  threshold for 128 nsec filter Bit 18: All filters were rejected flag. 0 = FALSE, 1 = TRUE. This flag will be set to true (1) if bits 0 through 5 in Range\_Status are set. Bits 19-31 are unused spares. Please see [the PDF flag description in the next section](flags/i_statflags.pdf) for more details. From APID12/13, Offset 120.

Comments:

Product Var Name `i_gainSet1064`

Is element of: GLA01 Long Waveform Record

Short Description: AD Gain Setting

Product Data Type: `i2b (8)`

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: The receiver gain; results of the gain algorithm. From APID12/13, Offset 148.

Comments:

Product Var Name `i_4nsPeakVal`

Is element of: GLA01 Long Waveform Record

Short Description: 4ns Filter Peak value

Product Data Type: `i2b (8)`

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Received pulse Peak value for the 4ns filter; returned by the FIR engine. From APID12/13, Offset 92.

Comments:

Product Var Name `i_8nsPeakVal`

Is element of: GLA01 Long Waveform Record

Short Description: 8ns Filter Peak value

Product Data Type: `i2b (8)`

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Received pulse Peak value for the 8ns filter; returned by the FIR engine. From APID12/13, Offset 94.

Comments:

Product Var Name i\_4nsBgMean

Is element of: GLA01 Long Waveform Record

Short Description: Background Mean Value

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: .01 counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 51200

Description: Background Noise Mean Value for the 4 ns filter. From APID12/13, Offset 112.

Comments:

Product Var Name i\_4nsBgSDEV

Is element of: GLA01 Long Waveform Record

Short Description: Background Standard Deviation

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: .01 counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 51200

Description: The standard deviation of the background noise for the 4 ns filter. From APID12/13, Offset 116.

Comments:

Product Var Name i\_samp\_pad

Is element of: GLA01 Long Waveform Record

Short Description: Echo Sample Padding

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: gates

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 544

Description: Surface echo sample padding. Number of zero bytes used to pad the surface echo data samples after averaging. From APID12/13, Offset 152.

Comments:

Product Var Name i\_comp\_type

Is element of: GLA01 Long Waveform Record

Short Description: Echo Compression Type

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Surface echo compression type. Indicates the type of compression performed. 0 = N, p, and q; 1 = r. From APID12/13, Offset 154.

Comments:

Product Var Name i\_rng\_wf

Is element of: GLA01 Long Waveform Record

Short Description: 1064 nm Range Waveform

Product Data Type: i1b (544, 8)

Total Bytes: 4352

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The 1064 nm echo waveform digitizer sample output, at 544 samples per shot over land and ice sheet and 200 samples per shot over sea ice and ocean. The surface type is determined by the instrument from

the on-board DEM. The digitized data was averaged according to the waveform compression parameters (M,N) and the compression ratio (p, q, and r).

Comments: This has no calibration applied. The calibration is applied internally during ground science algorithm processing. The calibration constants are available on ANC07 file.

Product Var Name `i_gainStatus`

Is element of: GLA01 Long Waveform Record

Short Description: Gain Status Bits

Product Data Type: `i1b (8)`

Total Bytes: 8

Product Units: `n/a`

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Note that these bits are always set to 0 on the first shot of a science run and when auto gain is disabled.

bit 0x1: 0 if the gain loop was run for this shot;

1 if the gain loop was bypassed for this shot;

bit 0x2: 0 if the gain loop did not time out;

1 if the gain loop timed out and was reset;

Comments:

Product Var Name `i_NumCoinc`

Is element of: GLA01 Long Waveform Record

Short Description: Number of Coincidences for Selected Filter

Product Data Type: `i1b (8)`

Total Bytes: 8

Product Units: `n/a`

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The number of coincidences between the selected filter and all other filters (including itself). This is one of the terms used to calculate the weight of the selected filter. If no filter is selected, this value is 0.

Comments:

Product Var Name `i_rawPkHt`

Is element of: GLA01 Long Waveform Record

Short Description: Height of Peak in Raw Waveform

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The maximum raw value in a specified range at the end of the return waveform. This value is used as the input to the gain control loop in place of the 8ns peak height.

Comments:

Product Var Name i\_spare2

Is element of: GLA01 Long Waveform Record

Short Description: Spare 2

Product Data Type: i1b (108)

Total Bytes: 108

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA01\_long spare2.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_gla01\_rectype

Is element of: GLA01\_Short\_Record

Short Description: GLA01 Record Type

Product Data Type: i2b

Total Bytes: 2

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2

Description: Record type indicating whether this record is a invalid=0, main=1, long=2, or short=3 waveform record.

Comments:

Product Var Name i\_spare1

Is element of: GLA01\_Short\_Record

Short Description: Spare 1

Product Data Type: i2b

Total Bytes: 2



Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_filtnum

Is element of: GLA01\_Short\_Record

Short Description: Filter Number

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5

Description: Filter with the highest weight (0 for 4 nsec filter; 1 for 8 nsec filter; 2 for 16 nsec filter; 3 for 32 nsec filter; 4 for 64 nsec filter; 5 for 128 nsec filter). May or may not be selectable! If no selectable filter can be chosen, then the last successful filter, selectable or NOT is chosen. From APID12/13, Offset 104.

Comments:

Product Var Name i\_shot\_ctr

Is element of: GLA01\_Short\_Record

Short Description: Shot Counter

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: The shot number for each of the 40 shots in this record. The shot count rolls over after reaching 200. From APID12/13, Offset 16.

Comments:

Product Var Name i\_statflags

Is element of: GLA01\_Short\_Record

Short Description: Range Window Status Word

Product Data Type: i4b (20)

Total Bytes: 80

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 262144

Description: Range Window Status word: Bit 0: No first crossing found on 4-nsec filter Bit 1: No first crossing found on 8-nsec filter Bit 2: No first crossing found on 16-nsec filter Bit 3: No first crossing found on 32-nsec filter Bit 4: No first crossing found on 64-nsec filter Bit 5: No first crossing found on 128-nsec filter Bit 6: No second crossing found on 4-nsec filter Bit 7: No second crossing found on 8-nsec filter Bit 8: No second crossing found on 6-nsec filter Bit 9: No second crossing found on 32-nsec filter Bit 10: No second crossing found on 64-nsec filter Bit 11: No second crossing found on 128-nsec filter Bit 12: First sample in range greater than or equal to threshold for 4 nsec filter Bit 13: First sample in range  $\geq$  to threshold for 8 nsec filter Bit 14: First sample in range  $\geq$  threshold for 16 nsec filter Bit 15: First sample in range  $\geq$  threshold for 32 nsec filter Bit 16: First sample in range  $\geq$  threshold for 64 nsec filter Bit 17: First sample in range  $\geq$  threshold for 128 nsec filter Bit 18: All filters were rejected flag. 0 = FALSE, 1 = TRUE. This flag will be set to true (1) if bits 0 through 5 in Range\_Status are set. Bits 19-31 are unused spares. Please see [the PDF flag description in the next section](flags/i_statflags.pdf) for more details. From APID12/13, Offset 120.

Comments:

Product Var Name i\_gainSet1064

Is element of: GLA01\_Short\_Record

Short Description: AD Gain Setting

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: The receiver gain; results of the gain algorithm. From APID12/13, Offset 148.

Comments: This number has calibrations applied so will differ from the value on the APID12/13.

Product Var Name i\_4nsPeakVal

Is element of: GLA01\_Short\_Record

Short Description: 4ns Filter Peak Value

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Received pulse Peak value for the 4ns filter; returned by the FIR engine. From APID12/13, Offset 92.

Comments:

Product Var Name i\_8nsPeakVal

Is element of: GLA01\_Short\_Record

Short Description: 8ns Filter Peak Value

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Received pulse Peak value for the 8ns filter; returned by the FIR engine. From APID12/13, Offset 94.

Comments:

Product Var Name i\_4nsBgMean

Is element of: GLA01\_Short\_Record

Short Description: Background Mean Value

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: .01 counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 51200

Description: Background Noise Mean Value for the 4 ns filter. From APID12/13, Offset 112.

Comments:

Product Var Name i\_4nsBgSDEV

Is element of: GLA01\_Short\_Record

Short Description: Background Standard Deviation

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: .01 counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 51200

Description: The standard deviation of the background noise for the 4 ns filter. From APID12/13, Offset 116

Comments:

Product Var Name i\_samp\_pad

Is element of: GLA01\_Short\_Record

Short Description: Echo Sample Padding

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: gates

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 544

Description: Surface echo sample padding. Number of zero bytes used to pad the surface echo data samples after averaging. From APID12/13, Offset 152.

Comments:

Product Var Name i\_comp\_type

Is element of: GLA01\_Short\_Record

Short Description: Echo Compression Type

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Surface echo compression type. Indicates the type of compression performed. 0 = N, p, and q; 1 = r. From APID12/13, Offset 154.

Comments:

Product Var Name i\_rng\_wf

Is element of: GLA01\_Short\_Record

Short Description: 1064 nm Range Waveform

Product Data Type: i1b (200, 20)

Total Bytes: 4000

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The 1064 nm echo waveform digitizer sample output, at 544 samples per shot over land and ice sheet and 200 samples per shot over sea ice and ocean. The surface type is determined by the instrument from the on-board DEM. The digitized data was averaged according to the waveform compression parameters (M,N) and the compression ratio (p, q, and r).

Comments: This has no calibration applied. The calibration is applied internally during ground science algorithm processing. The calibration constants are available on ANC07 file.

Product Var Name i\_gainStatus

Is element of: GLA01\_Short\_Record

Short Description: Gain Status Bits

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: Note that these bits are always set to 0 on the first shot of a science run and when auto gain is disabled.

bit 0x1: 0 if the gain loop was run for this shot;

1 if the gain loop was bypassed for this shot;

bit 0x2: 0 if the gain loop did not time out;

1 if the gain loop timed out and was reset;

Comments:

Product Var Name i\_NumCoinc

Is element of: GLA01\_Short\_Record

Short Description: Number of Coincidences for Selected Filter

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The number of coincidences between the selected filter and all other filters (including itself). This is one of the terms used to calculate the weight of the selected filter. If no filter is selected, this value is 0.

Comments:

Product Var Name i\_rawPkHt

Is element of: GLA01\_Short\_Record

Short Description: Height of Peak in Raw Waveform

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The maximum raw value in a specified range at the end of the return waveform. This value is used as the input to the gain control loop in place of the 8ns peak height.

Comments:

Product Var Name i\_spare2

Is element of: GLA01\_Short\_Record

Short Description: Spare 2

Product Data Type: i1b (184)

Total Bytes: 184

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA01\_short spare2.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04

LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i1\_pred\_lat

Is element of: GLA01 Main Record, GLA02 Record

Short Description: Predicted geodetic Latitude of the laser footprint

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic Latitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.

Comments:

Product Var Name i1\_pred\_lon

Is element of: GLA01 Main Record, GLA02 Record

Short Description: Predicted geodetic Longitude of the laser footprint

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The geodetic Longitude of the laser footprint; obtained from the predicted orbit; assuming the laser is nadir pointing.

Comments:

Product Var Name i\_DEMmin

Is element of: GLA02 Record

Short Description: DEM minimum

Product Data Type: i2b

Total Bytes: 2

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 12000

Description: Onboard spacecraft DEM minimum elevation used to calculate hmin. From APID19, Offset 1192.

Comments:

Product Var Name i\_DEMmax

Is element of: GLA02 Record

Short Description: DEM maximum

Product Data Type: i2b

Total Bytes: 2



Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 12000

Description: Onboard spacecraft DEM maximum elevation used to calculate hmax. From APID19, Offset 1193.

Comments:

Product Var Name i\_g\_lid\_qf

Is element of: GLA02 Record

Short Description: 532 nm LIDAR Data Quality Flag

Product Data Type: i1b (12)

Total Bytes: 12

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: 532 nm lidar data quality flag. 2 bits per shot for the 40 HZ profile; 2 bits per sum for the 5 Hz profile, 2 bits for the 1 Hz profile for a total of 92 bits. There are 4 spare bits. A value of 3 indicates the background data is out of bounds (0-100).

Please see [flags/i\\_g\\_lid\\_qf.pdf](flags/i_g_lid_qf.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i40\_g\_lid

Is element of: GLA02 Record

Short Description: 532 nm LIDAR Data from 10 KM to -1 KM

Product Data Type: i4b (148, 40)

Total Bytes: 23680

Product Units:  $((pe/bin)KM^2/J)/1000$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 100000000

Description: The normalized lidar signal from the 532 nm photon counting channel for the 10 KM to -1 segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied. NOTES: pe = photons; J = Joules.

Comments:

Product Var Name i5\_g\_lid

Is element of: GLA02 Record

Short Description: 532 nm LIDAR Data from 20 KM to 10 KM

Product Data Type: i4b (132, 5)

Total Bytes: 2640

Product Units: ((pe/bin)KM<sup>2</sup>/J)/1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 100000000

Description: The normalized lidar signal from the 532 nm photon counting channel for the 20 KM to 10 KM segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied. Sums of 8 samples.

Comments:

Product Var Name i1\_g\_lid

Is element of: GLA02 Record

Short Description: 532 nm LIDAR Data from 40 KM to 20 KM

Product Data Type: i4b (268)

Total Bytes: 1072

Product Units: ((pe/bin)KM<sup>2</sup>/J)/1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 100000000

Description: The normalized lidar signal from the 532 nm photon counting channel for the 40 KM to 20 KM segment of the atmosphere. Background subtraction, range squared, and dead time correction is applied.

Comments:

Product Var Name i40\_g\_sat\_f

Is element of: GLA02 Record

Short Description: 532 nm Saturation Flag for 10 to -1 KM Segment

Product Data Type: i1b (740)

Total Bytes: 740

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM profile. 0 = not saturated, 1 = saturated. 1 bit flag per each bin in the profile. There are 148 bins in the profile and the profiles occur at 40 per second for a total of 5920 flags (148 \* 40) per second. Bits 0-147 are the flags for shot 1, Bits 148-295 are the flags for shot 2, etc.

Please see <a href='flags/i40\_g\_sat\_f.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i5\_g\_sat\_f

Is element of: GLA02 Record

Short Description: 532 nm Saturation Flag for 20 to 10 KM Segment

Product Data Type: i1b (84)

Total Bytes: 84

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 20 to 10 KM Profile. 0 = not saturated, 1 = saturated. There is one flag per each bin in the profile. There are 132 bins in a profile and the profiles are summed over 8 shots for a total of 660 flags (132 \* 5) per second. Bits 0-131 are the flags for shots 1-8, Bits 132-263 are the flags for shots 9-16, etc. The upper 12 bits are spares.

Please see <a href='flags/i5\_g\_sat\_f.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i1\_g\_sat\_f

Is element of: GLA02 Record

Short Description: 532 nm Saturation Flag for 40 to 20 KM Segment

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Bit flag indicating whether the 532 nm signal is saturated or not for the 40 to 20 KM Segment. 0 = not saturated, 1 = saturated. There is one flag per each bin in the profile. There are 268 bins in a profile and the profile is summed over the 40 shots in a second for a total of 268 flags (268 \* 1) per second. The upper 20 bits are spares.

Please see <a href='flags/i1\_g\_sat\_f.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i40\_g\_TxNrg\_EU

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy at 40 Hz

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4500

Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor.

Comments: Not valid if APID19 is missing.

Product Var Name i5\_g\_TxNrg\_EU

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy at 5 Hz

Product Data Type: i4b (5)

Total Bytes: 20

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4500

Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor. Averaged over 8 shots.

Comments: Not valid if APID19 is missing.

Product Var Name i1\_g\_TxNrg\_EU

Is element of: GLA02 Record

Short Description: 532 nm Laser Transmit Energy at 1 Hz

Product Data Type: i4b

Total Bytes: 4

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4500

Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor. Averaged over 40 shots.

Comments:

Product Var Name i\_g\_IntRet

Is element of: GLA02 Record

Short Description: 532 nm Integrated Return, 40 to 20 KM

Product Data Type: i4b

Total Bytes: 4

Product Units: photons\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 500000

Description: Sum of raw photon counts (after background is subtracted) over the 20 to 40 km bins.

Comments:

Product Var Name i\_Rng2PCProf

Is element of: GLA02 Record

Short Description: Start Range of 532 nm Backscatter Profile

Product Data Type: i4b

Total Bytes: 4

Product Units: centimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: The range from the spacecraft to the start of the 532 nm backscatter profile - the start of the 40 KM segment of Lidar Data.

Comments: Not valid if APID19 is missing.

Product Var Name i\_Rng\_PkRt

Is element of: GLA02 Record

Short Description: Range from spacecraft to peak of return

Product Data Type: i4b

Total Bytes: 4

Product Units: centimeters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: Range calculated from the spacecraft to the location of the peak as returned in the telemetry (ground).

Comments:

Product Var Name i40\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Background at 40 Hz

Product Data Type: i4b (4, 40)

Total Bytes: 640

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.

Comments: Not valid if APID15 is missing.

Product Var Name i5\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Background at 5 Hz

Product Data Type: i4b (4, 5)

Total Bytes: 80

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i1\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532nm Background at 1 Hz

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals. (3) is background used to compute NRB. Averaged over 40 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i\_gPredCldTop

Is element of: GLA02 Record

Short Description: 532 nm Predicted Cloud Top Height at 5Hz

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The predicted height of the first cloud above local ground, predicted from the 532 nm lidar signal.

Comments:

Product Var Name i\_g\_shot\_ctr

Is element of: GLA02 Record

Short Description: 532 nm LIDAR Data Shot Counter

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Corresponds to first value of the 40 -1 km to 10 km aerosol science data. From APID15, Offset 14.

Comments:

Product Var Name i\_SpcmBg2Del

Is element of: GLA02 Record

Short Description: SPCM Background 2 Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The delay for the background #2 as read from the photon counter board. From APID19, Offset 586.

Comments:

Product Var Name i\_SpcmRngDel

Is element of: GLA02 Record

Short Description: SPCM Range Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The delay for the range gate as read from the photon counter board. This is the delay from the fire acknowledge to the start of data collection for the 40 KM profile.

Comments:

Product Var Name i\_SpcmGateDel

Is element of: GLA02 Record

Short Description: SPCM Gate Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535



Description: The SPCM Gate Delay from the photon counter board. This is the delay from the fire acknowledge prior to enabling the SPCMs.

Comments:

Product Var Name i\_SpcmBg1Del

Is element of: GLA02 Record

Short Description: SPCM Background 1 Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: nanoseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The Background #1 Delay from the photon counter board.

Comments:

Product Var Name i\_spcm\_stat

Is element of: GLA02 Record

Short Description: SPCM Status

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65280

Description: The status of the SPCM as read from the photon counter board. The Photon Counter Bd address 0xXX800004.

Comments:

Product Var Name i\_g\_TxNrg\_Cts

Is element of: GLA02 Record

Short Description: 532 nm Laser Transmit Energy, counts

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The 532 nm transmitted pulse energy, in raw counts from the transmitted pulse energy monitor.

Comments:

Product Var Name `i_g_TxNrg_qf`

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy Quality Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: Evaluation of the 532 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.

Please see <a href='flags/i\_g\_TxNrg\_qf.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name `i_g_IntRet_qf`

Is element of: GLA02 Record

Short Description: Integrated Return Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 5

Description: Assessment of the integrated return value; indicator of boresight accuracy and signal strength. 0 = unused, 1 = excellent, 2 = good, 3 = marginal, 4 = poor, 5 = bad data.

Please see <a href='flags/i\_g\_IntRet\_qf.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name `i_spare2`

Is element of: GLA02 Record

Short Description: Spare 2

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ir\_lid\_qf

Is element of: GLA02 Record

Short Description: 1064 nm LIDAR Data Quality Flag

Product Data Type: i1b (12)

Total Bytes: 12

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: 1064 nm lidar data quality flag. 2 bits per shot for the 40 HZ profile; 2 bits per sum for the 5 Hz profile for a total of 90 bits. The upper 6 bits are spares. A value of 3 indicates the background data is out of bounds (0-255).

Please see [flags/i\\_ir\\_lid\\_qf.pdf](flags/i_ir_lid_qf.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_ir\_shot\_ctr

Is element of: GLA02 Record

Short Description: 1064 nm Cloud Digitizer Shot Counter

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Shot number corresponding to first value of the 40 -1 km to 10 km cloud digitizer data.

## Comments:

Product Var Name i\_spcm\_cts

Is element of: GLA02 Record

Short Description: SPCM Raw Counts

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The raw counts for each photon counter (1-8) from the S? Photon Counter Module.

## Comments:

Product Var Name i\_pc\_rbias

Is element of: GLA02 Record

Short Description: Photon Counter Range Bias

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The range bias of the photon counter; always positive.

## Comments:

Product Var Name i40\_ir\_TxNrgEU

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy at 40 Hz

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 9000

Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature.

Comments: Not valid if APID19 and APID12 or APID13 are missing.

Product Var Name i5\_ir\_TxNrgEU

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy at 5 Hz

Product Data Type: i4b (5)

Total Bytes: 20

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 9000

Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature. Averaged over 8 shots.

Comments: Not valid if APID19 and APID12 or APID13 are missing.

Product Var Name i\_rng2CDProf

Is element of: GLA02 Record

Short Description: Start Range of the 1064 nm Backscatter Profile

Product Data Type: i4b

Total Bytes: 4

Product Units: centimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: The range from the spacecraft to the start of the 1064 nm backscatter profile - the start of the 20 KM segment of Lidar Data.

Comments:

Product Var Name i40\_ir\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Background at 40 Hz

Product Data Type: i4b (4, 40)

Total Bytes: 640

Product Units: W\*1.0d17

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000000

Product Maximum: 100000000

Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.

Comments: Not valid if APID17 is missing.

Product Var Name i5\_ir\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Background at 5 Hz

Product Data Type: i4b (4, 5)

Total Bytes: 80

Product Units: W\*1.0d17

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000000

Product Maximum: 100000000

Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i40\_ir\_lid

Is element of: GLA02 Record

Short Description: 1064 nm LIDAR Data from 10 KM to -1 KM

Product Data Type: i4b (148, 40)

Total Bytes: 23680

Product Units: (W\*KM^2)/J)\*1.0d8

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000000

Product Maximum: 1000000000

Description: The normalized lidar signal from the 1064 nm cloud digitizer data for the 10 KM to -1 KM atmospheric segment. Background subtraction, and range squared correction is applied.

Comments:

Product Var Name i5\_ir\_lid

Is element of: GLA02 Record

Short Description: 1064 nm LIDAR Data from 20 KM to 10 KM

Product Data Type: i4b (132, 5)

Total Bytes: 2640

Product Units:  $(W \cdot \text{KM}^2) / J \cdot 10^8$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000000

Product Maximum: 1000000000

Description: The normalized lidar signal from the 1064 nm cloud digitizer data for the 20 KM to 10 KM atmospheric segment. Background subtraction, and range squared correction is applied.

Comments:

Product Var Name i\_CdBg2\_Del

Is element of: GLA02 Record

Short Description: Cloud Digitizer Background 2 Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The delays for background #2 and the range gate from the cloud digitizer board.

Comments:

Product Var Name i\_RngGate\_Del

Is element of: GLA02 Record

Short Description: Cloud Digitizer Range Gate Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The delays for background #2 and the range gate from the cloud digitizer board.

Comments:

Product Var Name i\_cd\_bg1\_del

Is element of: GLA02 Record

Short Description: Cloud Digitizer Background 1 Delay

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The delay for background #1 from the cloud digitizer board.

Comments:

Product Var Name i\_cd\_det\_stat

Is element of: GLA02 Record

Short Description: Cloud Digitizer Detector Status

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Status of the detector from the cloud digitizer board.

Comments:

Product Var Name i\_cd\_rbias

Is element of: GLA02 Record

Short Description: Cloud Digitizer Range Bias

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The range bias from the cloud digitizer; always positive.



## Comments:

Product Var Name i\_cd\_ad\_out

Is element of: GLA02 Record

Short Description: A/D Output

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The output from the A/D converter; from the cloud digitizer board. Used for to diagnose problems with the analog path.

## Comments:

Product Var Name i\_cd\_att\_set

Is element of: GLA02 Record

Short Description: Attenuation Setting

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The attenuation setting from the cloud digitizer board.

## Comments:

Product Var Name i\_CldPkSig

Is element of: GLA02 Record

Short Description: Cloud Return Peak Signal

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: photons / bin

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32

Description: Peak photon count in the 532 nm backscatter data within the range for cloud returns; at the 5 Hz rate.

Comments:

Product Var Name i\_gndret\_pksig

Is element of: GLA02 Record

Short Description: Ground Return Peak Signal

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: photons / bin

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32

Description: Peak photon count in the 532 nm backscatter data. It is assumed that a ground return causes the maximum signal; at the 5 Hz rate.

Comments:

Product Var Name i\_gnd\_ret\_loc

Is element of: GLA02 Record

Short Description: Ground Return Location

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: bin number

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32

Description: Bin number (from the end of the profile) of the estimated ground return peak signal; at the 5 Hz rate.

Comments:

Product Var Name i\_et\_cal\_mode

Is element of: GLA02 Record

Short Description: Etalon Calibration - Current mode

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Current mode of Etalon calibration: 0 = Off, 1 = Acquire, 2 = Tracking, 3 = Invalid.

Comments:

Product Var Name i\_ir\_TxNrg\_qf

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy Quality Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: Evaluation of the 1064 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.

Please see <a href="flags/i\_ir\_TxNrg\_qf.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_EtHtrC37j\_c

Is element of: GLA02 Record, GLA03 Main Record

Short Description: Etalon Heater Current, Ch 37j

Product Data Type: i2b

Total Bytes: 2

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2500

Description: Etalon Heater Current, Ch 37j

Comments:

Product Var Name i\_EtC37d\_t

Is element of: GLA02 Record, GLA03 Main Record

Short Description: Etalon Temperature, Ch 37d

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Etalon Temperature, Ch 37d

Comments:

Product Var Name i\_ETsettleTime

Is element of: GLA02 Record

Short Description: Etalon Temperature Settle Time

Product Data Type: i2b

Total Bytes: 2

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The commanded time the software will wait after a temperature setpoint is sent to the etalon heater. Integer units in seconds. Applies only to tracking mode.

Comments:

Product Var Name i\_et\_Flags

Is element of: GLA02 Record

Short Description: Etalon Flags

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: bit 0: Etalon Tracking Low Transmission Flag (= low\_tr\_on)<br>

<br>

0 = GOOD (on-axis transmission is above limit)<br>

1 = LOW (on-axis transmission is below limit)<br>

<br>

bit 1: Etalon Tracking Active Flag (= track\_ok)<br>

<br>

0 = PAUSED (tracking is paused)<br>

1 = ACTIVE (tracking is active)<br>

<br>

bit 2: Etalon Test Mode Flag<br>

<br>

0 = NORMAL (reading data from LMB sensors)<br>

1 = TEST (using test data values)<br>

<br>

bit 3: Etalon Nonstandard Tracking Mode Flag<br>

<br>

0 = ORIGINAL (original tracking mode)<br>

1 = MODIFIED (open-loop or modified closed-loop mode)<br>

<br>

bit 4: Etalon Open-Loop Cycle Update Flag (= ol\_updates)<br>

<br>

0,1 = toggles each time an open-loop cycle starts<br>

Comments:

Product Var Name i\_et\_update\_ctr

Is element of: GLA02 Record

Short Description: Etalon Averaging Update Counter

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Etalon averaging update counter.

Comments:

Product Var Name i\_et\_StartTemp

Is element of: GLA02 Record

Short Description: Start Temperature

Product Data Type: i1b

Total Bytes: 1

Product Units: Celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Start Temperature

Comments:

Product Var Name i\_et\_StopTemp

Is element of: GLA02 Record

Short Description: Stop Temperature

Product Data Type: i1b

Total Bytes: 1

Product Units: Celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Stop Temperature.

Comments:

Product Var Name i\_et\_TempStep

Is element of: GLA02 Record

Short Description: Temperature Step

Product Data Type: i1b

Total Bytes: 1

Product Units: Celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Temperature Step

Comments:

Product Var Name i\_et\_spare

Is element of: GLA02 Record

Short Description: ET Spare

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA02 et spare.

Product Var Name i\_et\_acqavg\_tm

Is element of: GLA02 Record

Short Description: Etalon Averaging time for acquire command

Product Data Type: i1b

Total Bytes: 1

Product Units: seconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Etalon Averaging Time for Acquire Command.

Comments:

Product Var Name i\_spare6

Is element of: GLA02 Record

Short Description: Spare 6

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_et\_temperr

Is element of: GLA02 Record

Short Description: Etalon Temperature Error

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Temperature Error.

Comments:

Product Var Name i\_ET\_state

Is element of: GLA02 Record

Short Description: Etalon State

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: State of the etalon: 0 = Init, 1 = Set Temp, 2 = Wait, 3 = Average

Comments:

Product Var Name i\_spare3

Is element of: GLA02 Record

Short Description: Spare 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:



Product Var Name i\_et\_acqset\_tm

Is element of: GLA02 Record

Short Description: Etalon Temperature Settle time for acquire cmd

Product Data Type: i2b

Total Bytes: 2

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32767

Description: Etalon Temperature Settle Time for acquire cmd.

Comments:

Product Var Name i\_et\_onax\_xmit

Is element of: GLA02 Record

Short Description: Etalon Averaged on-axis Transmission

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Averaged on-axis Transmission.

Comments:

Product Var Name i\_et\_offax\_xmit

Is element of: GLA02 Record

Short Description: Etalon Averaged off-axis Transmission

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Averaged off-axis Transmission.

## Comments:

Product Var Name i\_et\_trkfltout

Is element of: GLA02 Record

Short Description: Etalon Tracking Loop Filter output

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Tracking Loop Filter output.

## Comments:

Product Var Name i\_et\_trkfltavg

Is element of: GLA02 Record

Short Description: Etalon Tracking Failure Average

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Tracking Failure Average

## Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see [the PDF flag description in the next section](flags/i_OrbFlg.pdf) for more details.

Comments:

Product Var Name i\_HoffMin

Is element of: GLA02 Record

Short Description: Offset to minimum DEM height

Product Data Type: i2b

Total Bytes: 2

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 12000

Description: Offset to minimum DEM height used in flight algorithm

Comments:

Product Var Name i\_Hsat

Is element of: GLA02 Record

Short Description: Geodetic altitude of satellite above earth

Product Data Type: i4b

Total Bytes: 4

Product Units: centimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: Geodetic altitude of satellite above earth's surface computed in real time by the GLAS flight algorithm.

Comments:

Product Var Name i\_4nsBgMean

Is element of: GLA02 Record

Short Description: 4ns Background Mean Value

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65536

Description: 4ns Filter Background mean

Comments:

Product Var Name i\_4nsBgSDev

Is element of: GLA02 Record

Short Description: 4ns Background Standard Deviation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65536

Description: 4ns filter background standard deviation.

Comments:

Product Var Name i\_DualPinA

Is element of: GLA02 Record

Short Description: Dual Pin A data

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Dual Pin A data (from APID19, offset 1248)

Comments:

Product Var Name i\_DualPinB

Is element of: GLA02 Record

Short Description: Dual Pin B Data

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Dual Pin B data from APID19, Offset 1288

Comments:

Product Var Name i\_spare4

Is element of: GLA02 Record

Short Description: Spare 4

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_DitheringEnabledFlag

Is element of: GLA02 Record, GLA07 Record

Short Description: Dithering Enabled Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 1

Description: 0=FALSE, 1=TRUEComments: Not valid if APID15 is missing.

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <[a href='\"/flags/i\\_timecorflg.pdf\"'](\"/flags/i_timecorflg.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name spare5

Is element of: GLA02 Record

Short Description: Spare 5

Product Data Type: i1b (12)

Total Bytes: 12

Product Units: n/a

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA02 spare5.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_spare1

Is element of: GLA05 record

Short Description: i\_spare1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.



## Comments:

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_lat

Is element of: GLA05 record

Short Description: Spot Coordinate Data - Latitude (Uncorrected)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the forty laser spots in this record, computed from the Precision orbit, precision attitude, and preliminary range. The preliminary range is used with no geodetic corrections applied.

Comments: This latitude may differ from that on GLA06 and the level 2 elevation products where a corrected range is used in the calculation

Product Var Name i\_lon

Is element of: GLA05 record

Short Description: Spot Coordinate Data - Longitude (Uncorrected)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the forty laser spots in this record, computed from the Precision orbit, precision attitude, and preliminary range. The preliminary range is used with no geodetic corrections applied.

Comments: This longitude may differ from that on GLA06 and the level 2 products where a corrected range is used in the calculation

Product Var Name i\_elev

Is element of: GLA05 record

Short Description: Spot Surface Elevation with respect to ITRF ellipsoid (Uncorrected)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -3300000

Product Maximum: 9000000

Description: The surface elevation with respect to ellipsoid of the forty laser spots in this record. The elevation is calculated using the preliminary range, the precision orbit, and precision attitude with no geodetic corrections applied.

Comments: This will differ from the elevation on the elevation products where it is calculated from the range corrected for geodetic affects and measured to a region-type dependent specific location on the received waveform.

Product Var Name i\_spare43

Is element of: GLA05 record

Short Description: Spare 43

Product Data Type: i4b (12, 40)

Total Bytes: 1920

Product Units: NA

Invalid Value/Flag: NA

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: NA

Product Maximum: NA

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA05 Spare43

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

Product Var Name i\_wfnoiseOb1

Is element of: GLA05 record

Short Description: 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Either the background noise mean value measured by the instrument, or the background noise calculated from the received echo using alternative parameters. See local flag definition for I\_WFqual - a flag is set if the background noise is calculated.

## Comments:

Product Var Name i\_wfnoiseOb2

Is element of: GLA05 record

Short Description: 1064 nm Background noise, (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Either the background noise mean value measured by the instrument, or the background noise calculated from the received echo using standard parameters. See local flag definition for I\_WFqual - a flag is set if the background noise is calculated.

## Comments:

Product Var Name i\_sDevNsOb1

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

Product Var Name i\_sDevNsOb2

Is element of: GLA05 record

Short Description: Standard deviation of 1064 nm Background noise, (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (standard parameters).

Comments:

Product Var Name i\_refRngNs

Is element of: GLA05 record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: .01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Two-way Reference range in time measured from the centroid of the transmit pulse to the last received echo digitizer gate telemetered (farthest from the spacecraft).

Comments: This is not the range measurement, but a reference value from which the offsets to calculate the range measurement are given. The range measurement will be to a specific location on the received echo that represents the surface response.

Product Var Name i\_thRtkRngOff1

Is element of: GLA05 record

Short Description: Threshold Retracker Range Offset (alternative)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the threshold retracker location on the received echo calculated using alternative parameters.

Comments: The position on the received echo for threshold retracking is calculated as the first received gate where the voltage is  $> n \cdot \sigma$  (see ATBD). This is calculated after converting the noise and waveform from counts to voltage.

Product Var Name i\_thRtkRngOff2

Is element of: GLA05 record

Short Description: Threshold Retracker Range Offset (standard)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the threshold retracker location on the received echo using standard parameters.

Comments: The position on the received echo for threshold retracking is calculated as the first received gate where the voltage is  $> n \cdot \sigma$  (see ATBD). This is calculated after converting the noise and waveform from counts to voltage.

Product Var Name i\_minRngOff1

Is element of: GLA05 record

Short Description: Minimum Range Offset (alternative)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using alternate parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage as the first received gate where the voltage is  $> n \cdot \sigma$  (see ATBD). The value of  $n$  may be different than threshold retracker.

Product Var Name i\_minRngOff2

Is element of: GLA05 record

Short Description: Minimum Range Offset (standard)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to `i_refRng` to give the two-way range in time to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) closest to the spacecraft using standard parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage as the first received gate where the voltage is  $> n \cdot \sigma$  (see ATBD). The value of  $n$  may be different than threshold retracker.

Product Var Name `i_preRngOff1`

Is element of: GLA05 record

Short Description: Preliminary Uncorrected Range Offset (alternative)

Product Data Type: `i4b` (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: `gi_invalid_i4b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to `i_refRng` to give the two-way range in time to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using alternative parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name `i_preRngOff2`

Is element of: GLA05 record

Short Description: Preliminary Uncorrected Range Offset (standard)

Product Data Type: `i4b` (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: `gi_invalid_i4b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to `i_refRng` to give the two-way range in time to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD). This is the range used to calculate the geodetic coordinates of the footprint and elevations on this record.

Product Var Name `i_centroid1`

Is element of: GLA05 record

Short Description: Centroid retracker offset (alternative)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the location of the centroid of the received echo from signal begin through signal end defined by the alternative parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name i\_centroid2

Is element of: GLA05 record

Short Description: Centroid retracker offset (standard)

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.

Comments: This is calculated after the received echo and noise values are calibrated and converted from counts to voltage (see ATBD).

Product Var Name i\_centroidInstr

Is element of: GLA05 record

Short Description: Centroid retracker offset using max peak

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the two-way range in time to the location on the received echo of the centroid of the signal surrounding the maximum amplitude peak.



Comments: This is the definition used by the instrument team to check out the on-board algorithms. See ATBD

Product Var Name i\_areaRecWF1

Is element of: GLA05 record

Short Description: Area under received echo (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 volts \* ns

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: Area under the received echo from signal begin to signal end using alternative parameters.

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_areaRecWF2

Is element of: GLA05 record

Short Description: Area under received echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 volts \* ns

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: Area under the received echo from signal begin to signal end using standard parameters.

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_maxRecAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.

Product Var Name i\_maxSmAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_reflctUncorr

Is element of: GLA05 record

Short Description: Reflectivity not corrected for Atmospheric Effects

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. i\_reflctUncorr has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = i\_reflctUncorr \* (i\_RecNrgAll + i\_satNrgCorr)/i\_RecNrgAll)

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.

<br>

GLA06%i\_reflctUC is the same as i\_reflctUncorr, except that it is invalid when

GLA06%d\_satNrgCorr is invalid.

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflectuncmxpk

Is element of: GLA05 record

Short Description: Reflectivity Not Corrected For Atmospheric Effects from max peak

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: unitless x1.E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects from max peak, is calculated as  $Refl = R/T$ , where R is the received energy from the maximum amplitude peak of the waveform after it has been scaled for range, and T is the transmitted energy. i\_reflectuncmxpk has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = i\_reflectuncmxpk \* (i\_RecNrgAll + i\_satNrgCorr)/i\_RecNrgAll)<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.<br>

Comments: This uses only the signal surrounding the maximum peak.

Product Var Name i\_tpCentX

Is element of: GLA05 record

Short Description: LPA Centroid X

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: arcsec\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: X position of the centroid of the transmit pulse in the LPA, in arcsec from the left edge of the LPA (outer edge of pixel column 0). From ANC09.

Comments:

Product Var Name i\_tpCentY

Is element of: GLA05 record

Short Description: LPA Centroid Y

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: arcsec\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: Y position of the centroid of the transmit pulse in the LPA, in arcsec from the upper edge of the LPA (outer edge of pixel row 0). From ANC09.

Comments:

Product Var Name i\_nPeaks1

Is element of: GLA05 record, GLA06 record, GLA14 Record

Short Description: Initial Number of Peaks in received echo (alternate)

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 50

Description: The initial number of peaks of the received echo; determined from the smoothed waveform, using alternative parameters

Comments:

Product Var Name i\_nPeaks2

Is element of: GLA05 record

Short Description: Initial Number of Peaks in received echo (standard)

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 50

Description: The initial number of peaks found in the received echo; determined from the smoothed waveform, using standard parameters

Comments:

Product Var Name i\_parm1

Is element of: GLA05 record

Short Description: Parameters from the Gaussian fit to the received echo (alternative)

Product Data Type: i4b (19, 40)

Total Bytes: 3040

Product Units: 0.0001 volts, 6 \* (0.0001 volts, 0.01 ns, 0.01 ns)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -30, 6 \* (0, -100000, 0)

Product Maximum: 30000, 6 \* (30000, 0, 32766)

Description: Parameters (in physical units) determined from the fit of the received echo using the alternative parameterization. In the order of: item1=noise (millivolts), then 6 sets of three Gaussian parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the Gaussian parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the Gaussian parameters for the next-to-last (2nd) peak. Items 17-19 are the Gaussian parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid. Adding the location to i\_refRng gives the two-way range in time to the center of that peak.

Comments: The received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_parm2

Is element of: GLA05 record

Short Description: Parameters from Gaussian fit to the received echo (standard)

Product Data Type: i4b (19, 40)

Total Bytes: 3040

Product Units: 0.0001 volts, 6 \* (0.0001 volts, 0.01 ns, 0.01 ns)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -30, 6 \* (0, -100000, 0)

Product Maximum: 30000, 6 \* (30000, 0, 32766)

Description: Parameters (in physical units) determined from the fit of the received echo using the standard parameterization. In the order of: item1=noise (millivolts), then 6 sets of Gaussian parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the Gaussian parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the Gaussian parameters for the next-to-last (2nd) peak. Items 17-19 are the Gaussian parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid. Adding the location to i\_refRng gives the two-way range in time to the center of that peak.

Comments: The received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_solnSigmas1

Is element of: GLA05 record

Short Description: Sigmas of fit parameters (alternative)

Product Data Type: i2b (19, 40)

Total Bytes: 1520

Product Units: 0.0001 volts, 6 \* (0.0001 volts, 0.001 ns, 0.001 ns)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000, 6 \* (30000, 3000, 3000)

Description: Standard deviation of each fit parameter from diagonal of final covariance matrix from alternative parameterization. In the order of: item1=noise (millivolts), then 6 sets of three parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the parameters for the next-to-last (2nd) peak. Items 17-19 are the parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid.

Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_solnSigmas2

Is element of: GLA05 record

Short Description: Sigmas of fit parameters (standard)

Product Data Type: i2b (19, 40)

Total Bytes: 1520

Product Units: 0.0001 volts, 6 \* (0.0001 volts, 0.001 ns, 0.001 ns)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000, 6 \* (30000, 3000, 3000)

Description: Standard deviation of each fit parameter from diagonal of final covariance matrix from standard parameterization. In the order of: item1=noise (millivolts), then 6 sets of three parameters (subitem1=amplitude (millivolts), subitem2=peak location (ns), and subitem3=sigma (ns)). Items 2-4 are the parameters for the last (closest-to-the-ground or 1st) peak. Items 5-7 are the parameters for the next-to-last (2nd) peak. Items 17-19 are the parameters for the closest-to-the-satellite peak. If there are fewer than six peaks, the unused parameters are set invalid.

Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_wfFitSDev\_1

Is element of: GLA05 record

Short Description: The received echo fit standard deviation (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the difference between the functional fit and the received echo using alternative parameters.

Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_wfFitSDev\_2

Is element of: GLA05 record

Short Description: The received echo fit standard deviation (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: microvolts\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the difference between the functional fit and the received echo using the standard parameters

Comments: Note that the received echo was calibrated and converted from counts to voltage using table in header records before the fit was performed.

Product Var Name i\_tpintensity

Is element of: GLA05 record

Short Description: Transmit pulse intensity

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. From ANC09.

Comments:

Product Var Name i\_tpazimuth

Is element of: GLA05 record

Short Description: Transmit pulse azimuth

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deg\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity

Is element of: GLA05 record

Short Description: Transmit pulse eccentricity

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: e\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis

Is element of: GLA05 record

Short Description: Transmit pulse major axis

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. From ANC09.

Comments:



Product Var Name i\_skew1

Is element of: GLA05 record, GLA14 Record

Short Description: Skewness of Received Echo (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Skewness of the received echo from signal begin to signal end using alternative parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_kurt1

Is element of: GLA05 record, GLA14 Record

Short Description: Kurtosis of Received Echo (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using alternative parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_skew2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Skewness

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The skewness of the received echo from signal begin to signal end using standard parameters.

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_kurt2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Kurtosis of the Received Echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using standard parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_WFqual

Is element of: GLA05 record

Short Description: Received Echo Quality Flag

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Indicator of the quality of the received echo (waveform); determined during the received echo assessment process, and the functional fit. Each 4 byte integer represents 32 bits of flag information. For definitions of each bit,

Please see <a href='flags/i\_WFqual.pdf'> the PDF flag description in the next section.

Comments:

Product Var Name i\_TxNrg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name i\_tpOrX

Is element of: GLA05 record

Short Description: Pulse Orientation

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Pulse Orientation (Angle measured counter-clockwise from LPA X-axis)

Comments:

Product Var Name i\_locTr

Is element of: GLA05 record

Short Description: Centroid of Transmitted Pulse in time relative to gate 1 of tr wf

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4800

Description: Time from gate 1 of the transmitted pulse to the centroid of transmitted pulse calculated from 48 gates telemetered

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name i\_parmTr

Is element of: GLA05 record

Short Description: Parameters of the Gaussian fit to the Transmitted Pulse

Product Data Type: i4b (4, 40)

Total Bytes: 640

Product Units: microvolts\*100, microvolts\*100, 0.01 ns, 0.01 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -30, -30, 0, 0

Product Maximum: 30000, 30000, 4800, 32766

Description: Parameters from the Gaussian fit to the transmitted pulse: item1=noise (millivolts), item2=amplitude (millivolts), Item3=peak location (ns), and item 4=sigma (ns). Peak location is relative to gate 1 of the transmit pulse.

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name i\_sDevFitTr

Is element of: GLA05 record

Short Description: Standard deviation of fit of transmitted pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: microvolts\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: Standard deviation of fit of a gaussian model to the transmitted pulse

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name i\_skewTr

Is element of: GLA05 record

Short Description: Skewness of Transmitted Pulse

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: NA

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Skewness of transmitted pulse

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name i\_maxTrAmp

Is element of: GLA05 record

Short Description: Maximum Amp of Transmitted Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.1 millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum amplitude of transmitted pulse calculated from all (48) gates telemetered

Comments: Note that the pulse was calibrated and converted to voltage before calculation.

Product Var Name i\_gval\_tx

Is element of: GLA05 record

Short Description: Gain Value used for Transmitted Pulse - uncalibrated

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for transmitted pulse - uncalibrated

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Main/i\_ADdetOutGn.

Product Var Name i\_compRatio

Is element of: GLA01 Main Record, GLA05 record

Short Description: Compression Ratios

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 5

Description: Averaging values p and q for frame. First item is p; second is q. From APID19, Offset 232. First N downlink samples are generated by averaging p raw digitized elements and the rest of the allocated samples in the waveform by averaging q elements.

Comments: Not valid if APID19 is missing.

Product Var Name i\_N\_val

Is element of: GLA01 Main Record, GLA05 record

Short Description: Value of N

Product Data Type: i2b

Total Bytes: 2

Product Units: gates

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 544

Description: Value of N used for waveform compression for the frame. From APID19, Offset 236.

Comments: Not valid if APID19 is missing.

Product Var Name i\_r\_val

Is element of: GLA01 Main Record, GLA05 record

Short Description: Value of r

Product Data Type: i2b

Total Bytes: 2

Product Units: unitless

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 8

Description: Value of r used for waveform compression for frame. From APID19, Offset 238. Not valid if APID19 is missing.

Comments: After M shots with no valid return, the 'p' and 'q' averaging of the normal downlinked waveform compression type will be overridden and instead the telemetered received echo will consist of average samples averaged over 'r' raw samples.

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the [PDF file](flags/i_ElvuseFlg.pdf) for more information.

Comments:

Product Var Name i\_spare3

Is element of: GLA05 record

Short Description: Spare 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see [the PDF flag description in the next section](flags/i_ElvFlg.pdf) for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href="flags/i\_timecorflg.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127



Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see [the PDF flag description in the next section](flags/i_AttFlg2.pdf) for more details.

Comments:

Product Var Name i\_spare4

Is element of: GLA05 record

Short Description: Spare 4

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <a href='flags/i\_FrameQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_rngCorrFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see <a href='flags/i\_rngCorrFlg.pdf'> the PDF flag description in the next section for more details.

## Comments:

Product Var Name i\_spare5

Is element of: GLA05 record

Short Description: Spare 5

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: NA

Product Maximum: NA

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

## Comments:

Product Var Name i\_beam\_coelev

Is element of: GLA05 record, GLA07 Record

Short Description: Co-elevation

Product Data Type: i4b

Total Bytes: 4

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

## Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA05 record, GLA07 Record

Short Description: Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='\"/flags/i\_AttFlg1.pdf\"'>the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_RMSpulseWd

Is element of: GLA05 record

Short Description: RMS Pulse Width

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 100 ns

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: The RMS width of the entire received waveform. See Eq 5 of ATBD for Derivation of Range.

Comments:

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

Product Var Name i\_numIters

Is element of: GLA05 record

Short Description: Number of iterations performed during fit

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 15

Description: The algorithm variable gla05%i\_numIters(40,2) contains the number of iterations for both the standard fit (shot,2), and the alternate fit (shot,1). These numbers are packed into forty bytes on the product:

GLA05\_prod%i\_numIters(1) contains:

bits 0-3: number of iterations for alternate fit for shot 1,

bits 4-7: number of iterations for standard fit for shot 1

GLA05\_prod%i\_numIters(2) contains:

bits 0-3: number of iterations for alternate fit for shot 2,

bits 4-7: number of iterations for standard fit for shot 2

GLA05\_prod%i\_numIters(40) contains:

bits 0-3: number of iterations for alternate fit for shot 40,

bits 4-7: number of iterations for standard fit for shot 40

Comments:

Product Var Name i\_spare6

Is element of: GLA05 record

Short Description: Spare 6

Product Data Type: i1b (70)

Total Bytes: 70

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: NA

Product Maximum: NA

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_Spare1

Is element of: GLA06 record

Short Description: Spare 1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA06 spare1.

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.

Comments:

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_lat

Is element of: GLA06 record



Short Description: Spot 1 Coordinate Data, Latitude Corrected

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit, precision attitude, and ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The values are in degrees North.

Comments:

Product Var Name i\_lon

Is element of: GLA06 record

Short Description: Spot 1 Coordinate Data, Longitude Corrected

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit, precision attitude, and ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.

Comments:

Product Var Name i\_elev

Is element of: GLA06 record

Short Description: Surface Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Surface elevation with respect to the ellipsoid at the spot location determined by the ice-sheet specific range after instrument corrections, atmospheric delays and tides have been applied. The saturation elevation correction (i\_satElevCorr) has not been applied and needs to be added to this elevation. This can be over a one meter correction. If it is invalid then the elevation should not be used. The saturation correction flag (i\_satCorrFlg) is an important flag to understand the possible quality of the elevation data. The saturation index (i\_satNdx) can be used for more understanding of concerns on data quality from saturation effects. Also no correction for pulse spreading from forward scatter has been applied.

Comments:

Product Var Name i\_campaign

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Campaign

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: INT(ICHAR(1A))

Product Maximum: INT(ICHAR(3K))

Description: The campaign. ie: for campaign L1A, it will be '1A'.

Comments:

Product Var Name i\_spare40

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 40

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 40.

Product Var Name i\_cycTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cycle and Track

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 10001

Product Maximum: 9991354

Description: The track and cycle. On the product, they will be stored as one number: ccctttt.

Comments:

Product Var Name i\_localSolarTime

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local apparent solar time

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 86400000

Description: Local apparent solar time.

Comments:

Product Var Name i\_spare41

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 41

Product Data Type: i4b (7)

Total Bytes: 28

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information. Comments: Spare 41.

Product Var Name i\_deltaEllip

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta Ellipsoid

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -9000

Product Maximum: 9000

Description: Surface Elevation (T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).

Comments:

Product Var Name i\_beamCoelv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Co-elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot. 40Hz.

Comments:

Product Var Name i\_beamAzimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Azimuth

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.

Comments:

Product Var Name i\_d2refTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Distance to the reference ground track

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: m\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000000

Description: Distance to the reference ground track.

Comments:

Product Var Name i\_SigBegOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal Begin Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.

Comments:

Product Var Name i\_DEM\_hires\_src

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: High Resolution Source Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Flag to specify who the source provider was for the high resolution DEM. <br>

0 = no high res source available<br>

1 = unfinished research Shuttle Radar Topography Mission (SRTM)<br>  
 &nbsp; &nbsp; &nbsp; &nbsp; C-band 90 m DEM produced by JPL (+-1.1km E-W swath)<br>  
 2 = finished SRTM C-band 90 m DEM produced by NGA (+-2.1km E-W swath)<br>  
 3 = ICESat Greenland V1 1km DEM<br>  
 4 = ICESat Antarctica V1 500m DEM<br>  
 5 = 90m Canadian Digital Elevation Data (CDED)<br>  
 6 = 90m Canadian Digital Elevation Data (CDED) if available otherwise finished SRTM C-band 90 m DEM<br>  
 Comments: DEM elevations are referenced to the TOPEX/Poseidon ellipsoid and are directly comparable to the elevation on the GLAS products.

Product Var Name i\_DEMhiresArElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEMhiresArElv

Product Data Type: i2b (9, 40)

Total Bytes: 720

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500

Product Maximum: 1300

Description: d\_DEMhiresArElv is a 3 X 3 X 40 array of high resolution DEM values. The 1-40 index corresponds to 1/40 second samples. The 1-9 index corresponds to the position of the DEM value relative to the spot. Given the first 1/40 second of data, positional correspondence of the DEM element to the spot is as follows:<br>

<br>

The 9 points on the product correspond to the 3x3 points in the alg variable as follows:<br>

<br>

gla06%d\_DEMhiresArElv(1,1,k) = gla06\_prod%i\_DEMhiresArElv(1,k) NW<br>

gla06%d\_DEMhiresArElv(2,1,k) = gla06\_prod%i\_DEMhiresArElv(2,k) N<br>

gla06%d\_DEMhiresArElv(3,1,k) = gla06\_prod%i\_DEMhiresArElv(3,k) NE<br>

gla06%d\_DEMhiresArElv(1,2,k) = gla06\_prod%i\_DEMhiresArElv(4,k) W<br>

gla06%d\_DEMhiresArElv(2,2,k) = gla06\_prod%i\_DEMhiresArElv(5,k) center<br>

gla06%d\_DEMhiresArElv(3,2,k) = gla06\_prod%i\_DEMhiresArElv(6,k) E<br>

gla06%d\_DEMhiresArElv(1,3,k) = gla06\_prod%i\_DEMhiresArElv(7,k) SW<br>

gla06%d\_DEMhiresArElv(2,3,k) = gla06\_prod%i\_DEMhiresArElv(8,k) S<br>

gla06%d\_DEMhiresArElv(3,3,k) = gla06\_prod%i\_DEMhiresArElv(9,k) SE<br>

<br>

Comments:

Product Var Name i\_ElevBiasCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Bias Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments: See the altimeter user guide for full description.

Product Var Name i\_spare42

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 42

Product Data Type: i2b (4, 40)

Total Bytes: 320

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 42

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_Azimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: millideg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.

Comments:

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_tpintensity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse intensity - frame avg

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA



Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpazimuth\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse azimuth - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse eccentricity - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: Unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse major axis - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.

Comments:

Product Var Name i\_poTide

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Pole Tide

Product Data Type: i2b

Total Bytes: 2

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Pole tide: an ocean tide which is the result of the Chandler wobble (a free nutation of the Earth caused by fluctuating pressure on the bottom of the ocean, caused by temperature and salinity changes and wind-driven changes in the circulation of the oceans).

Comments:

Product Var Name i\_gdHt

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Geoid

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -20000

Product Maximum: 20000

Description: The height of the geoid above the ellipsoid for the first and last shot in the record.

Comments:

## Product Var Name i\_erElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solid Earth Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The solid earth tide elevation for the first & last shot in the record.

Comments:

## Product Var Name i\_spElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Tide Elevations, Specific

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.

Comments:

## Product Var Name i\_IdElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Load Tide Elevation

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.

Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name i\_spare12

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spares 12

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_wTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction\_Wet Troposphere

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 0

Description: The range correction due to the wet troposphere at first & last shot.

Comments:

Product Var Name i\_dTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Range Correction, Dry Troposphere

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 0

Description: The range correction due to the dry troposphere; one correction for each shot. Validity is based on results of finding a range with the standard fit.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <a href='flags/i\_surfType.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare11

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 11

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_DEM\_elv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEM Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -50000

Product Maximum: 1000000

Description: Elevation at the footprint location from the SRTM30 (GTOPO30 + SRTM) Digital Elevation Model (DEM). The reference frame for the DEM elevation was changed to the TOPEX/Poseidon ellipsoid to make it consistent with the GLAS elevations.

Comments:

Product Var Name i\_refRng

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Range in distance calculated from the time between the centroid of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.

Comments:

Product Var Name i\_TrshRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Threshold Retracker Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the threshold retracker location on the received echo using standard parameters.

## Comments:

Product Var Name i\_spare47

Is element of: GLA06 record, GLA14 Record

Short Description: Spare 47

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

## Comments:

Product Var Name i\_SigEndOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal End Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.

## Comments:

Product Var Name i\_cntRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Centroid Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.

Comments:

Product Var Name i\_reflctUC

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: reflctUC

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. i\_reflctUC has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity =  $i\_reflctUC * (i\_RecNrgAll + i\_satNrgCorr)/i\_RecNrgAll$ )<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.<br>

<br>

i\_reflctUC is invalid where GLA06%d\_satNrgCorr is invalid.<br>

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflCor\_atm

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i4b

Total Bytes: 4

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 250

Description: This reflectance correction factor is calculated as  $1 / e^{-(2(tc+ta+tp+tm))}$ , where tc is the cloud (column) integrated optical depth, ta is the aerosol (column) integrated optical depth, tp is the planetary boundary



layer optical depth, and  $t_m$  is the molecular optical depth.  $t_m$  is a constant equal to  $-\log(gd\_T\_RT_{atm})/2$ , where  $gd\_T\_RT_{atm} = 0.98$  is defined in `const_elev_mod.f90` or read from ANC07-03. The attenuation correction factor has been corrected for multiple scattering. The reflectance has been corrected for waveform saturation.

Comments:

Product Var Name `i_maxSmAmp`

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: `i2b (40)`

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name `i_ocElv`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Ocean Tide Elevation

Product Data Type: `i2b (40)`

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: `gi_invalid_i2b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The ocean tide elevation from the TPX07.1 tide model.

Comments:

Product Var Name `i_numPk`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Number of Peaks found in the Return

Product Data Type: `i1b (40)`

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: The number of peaks in the return echo found by the Gaussian fitting procedure, using standard parameters.

Comments:

Product Var Name i\_kurt2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Kurtosis of the Received Echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using standard parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_skew2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Skewness

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The skewness of the received echo from signal begin to signal end using standard parameters.

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_spare4

Is element of: GLA06 record, GLA12 Record, GLA14 Record, GLA15 Record

Short Description: Spare 4

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_isRngOff

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Ice Sheet Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for ice sheets.

Comments: Can be used for comparing elevations computed from results standard and alternate fitting.

Product Var Name i\_siRngOff

Is element of: GLA06 record, GLA13 Record

Short Description: Sea Ice Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for sea ice.

Comments:

Product Var Name i\_IdRngOff

Is element of: GLA06 record, GLA14 Record

Short Description: Land Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for land.

Comments:

Product Var Name i\_ocRngOff

Is element of: GLA06 record, GLA15 Record

Short Description: Ocean Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for oceans.

Comments:

Product Var Name i\_nPeaks1

Is element of: GLA05 record, GLA06 record, GLA14 Record

Short Description: Initial Number of Peaks in received echo (alternate)

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 50

Description: The initial number of peaks of the received echo; determined from the smoothed waveform, using alternative parameters

Comments:

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the <a href='flags/i\_ElvuseFlg.pdf'>PDF file</A> for more information.

Comments:

Product Var Name i\_atm\_avail

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see <a href='flags/i\_atm\_avail.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare16

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 16

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cld1\_mswf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify ?invalid?. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically ?thick? cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range. Please see <a href="flags/i\_cld1\_mswf\_elv.pdf">the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_MRC\_af

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Medium Resolution Cloud Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Tells how many cloud layers were found at this resolution from the 532 nm channel. Please see <a href='flags/i\_MRC\_af.pdf'> the PDF flag description in the next section for more details. This parameter is extracted from the i\_MRCL\_flag on GLA09.

Comments:

Product Var Name i\_spare9

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Spare 9

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see <a href='flags/i\_ElvFlg.pdf'> the PDF flag description in the next section for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_rng\_UQF

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Offset Quality/Use Flag

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Data quality flag for the range offsets on this record.

Please see <[a href='\"/flags/i\\_rng\\_UQF.pdf\"'](\"/flags/i_rng_UQF.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <[a href='\"/flags/i\\_timecorflg.pdf\"'](\"/flags/i_timecorflg.pdf\")> the PDF flag description in the next section for more details.

Comments:



## Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

## Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

## Product Var Name i\_spare5

Is element of: GLA06 record

Short Description: Spare 5

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <a href='flags/i\_FrameQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_rngCorrFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see <[a href='flags/i\\_rngCorrFlg.pdf'](flags/i_rngCorrFlg.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_CorrStatFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Correction Status Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

Please see <[a href='flags/i\\_CorrStatFlg.pdf'](flags/i_CorrStatFlg.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare15

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 15

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Spare6

Is element of: GLA06 record

Short Description: Spare 6

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA06 spare6.

Product Var Name i\_spare44

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 44

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_satElevCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Elevation Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments:

Product Var Name i\_satCorrFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Correction Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: NA

Product Maximum: NA

Description: Please see [flags/i\\_satCorrFlg.pdf](flags/i_satCorrFlg.pdf) the PDF flag description in the next section for more details.<br>

<br>

Bits 0-3: i\_satElevCorr flag (4 bits); values indicated below: <br>

<br>

0= Not Saturated (i\_satNdx < 2) or No Signal<br>

1= Sat. Correction is Inconsequential (i\_satNdx >= 2 & i\_pctSat < 2.0)<br>

2= Sat. Correction is Applicable (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* < 100ns)<br>

3= Sat. Correction is Not Computable effects elevations can not be corrected <br>

4= Sat. Correction model is Not Applicable so data can not be corrected (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* >= 100ns) there are errors in the data but the effects on elevations can not be corrected <br>

<br>

values 5-15=TBD

Bits 4-5: i\_satNrgCorr flag (2 bits):<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

<br>

Bits 6-7: TBD:<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

Comments:

Product Var Name i\_satNrgCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Energy Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: .01fJ

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.

Comments:

Product Var Name i\_spare13

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 13

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: null

Invalid Value/Flag: null

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

**Product Var Name** i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

**Product Var Name** i\_FRir\_cldtop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 1 second record. This parameter is in GLA09.

Comments:

**Product Var Name** i\_FRir\_qaFlag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0



Product Maximum: 15

Description: One byte per data quality flag.

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height. Please see [i\\_FRir\\_qaFlag.pdf](flags/i_FRir_qaFlag.pdf) the PDF flag description in the next section for more details. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere

0 clear

1 high cloud (> 5 km) low optical depth

2 high cloud (> 5 km), high optical depth

3 mid cloud (>2, <=5 km) low optical depth

4 mid cloud (>2, <=5 km) high optical depth

5 low cloud (> 500 m, <=2 km), low optical depth

6 low cloud (> 500 m, <=2 km), high optical depth

7 blowing snow or fog (< 500 m), low optical depth

8 blowing snow or fog (< 500 m), high optical depth

9 not tested

10 data quality insufficient to assign flag

Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag

Comments: 0 Not applicable (for contamination flag values of 9 or 10)

1 low confidence

2 reasonable confidence

3 high confidence

Product Var Name i\_spare48

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 48

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FRir\_intsig

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: e7/(m-sr)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of  $1.0e-7$  (1/(m-sr) units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_spare14

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 14

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Atmospheric temperature at Earth's surface level measured in degrees Celsius and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Atmospheric pressure at Earth's surface level measured in hPa and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.

Comments:

Product Var Name i\_pctSAT

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Percent Saturation

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: percent

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: -127

Product Maximum: 127

Description: Percent saturation (d\_pctSAT) is calculated using the formula:  $d\_pctSAT = 100 * (\text{saturation index}) / (\text{signal end} - \text{signal begin in nanoseconds})$ . The alternate signal end/begin are used for GLA14% d\_pctSAT, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid satElevCorr values and satCorrFlg values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.

Comments:

**Product Var Name i\_maxRecAmp**

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.

**Product Var Name i\_sDevNsOb1**

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

**Product Var Name i\_TxNrg**

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name i\_eqElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Equilibrium Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -10000

Product Maximum: 10000

Description: The equilibrium (long period) tide at first and last valid shot over the ocean.

Comments:

Product Var Name i\_Spare7

Is element of: GLA06 record, GLA12 Record, GLA13 Record

Short Description: Spare 7

Product Data Type: i1b (282)

Total Bytes: 282

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA06, GLA12, GLA13 spare7.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole

number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_beam\_coelev

Is element of: GLA05 record, GLA07 Record

Short Description: Co-elevation

Product Data Type: i4b

Total Bytes: 4

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA05 record, GLA07 Record

Short Description: Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees.

Comments:

Product Var Name i\_spare0

Is element of: GLA07 Record

Short Description: Spares 0

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA07 spare0.

Product Var Name i\_lat

Is element of: GLA07 Record

Short Description: Profile Coordinate, Latitude

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA



Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_lon

Is element of: GLA07 Record

Short Description: Profile Coordinate, Longitude

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_APIID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APIID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see <[a href='\"#\"'>flags/i\\_OrbFlg.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_LidarQF

Is element of: GLA07 Record

Short Description: Lidar Frame quality flag

Product Data Type: i2b

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <[a href='\"#\"'>flags/i\\_LidarQF.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.  
Please see [the PDF flag description in the next section](\"flags/i_AttFlg1.pdf\") for more details.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.  
Please see [the PDF flag description in the next section](\"flags/i_surfType.pdf\") for more details.

Comments:

Product Var Name i\_Spare1

Is element of: GLA07 Record

Short Description: Spare 1

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA07 spare1.

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_pad\_angle

Is element of: GLA07 Record

Short Description: PAD Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Attitude angle calculated from PAD and POD.

Comments:

Product Var Name i\_rng\_geoid

Is element of: GLA07 Record

Short Description: Range of satellite above geoid

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 60000000

Description: Range of satellite above geoid based upon POD, PAD, and geoid

Comments:

Product Var Name i\_topo\_elev

Is element of: GLA07 Record

Short Description: Topographic elevation of surface above geoid

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 32000

Description: Topographic elevation of surface above geoid based upon POD, PAD, and geoid

Comments:

Product Var Name i\_Rng2PCProf\_Cor

Is element of: GLA07 Record

Short Description: Start Range of 532 nm Backscatter Profile

Product Data Type: i4b

Total Bytes: 4

Product Units: centimeters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: The range from the spacecraft to the start of the 532 nm backscatter profile - the start of the 40 KM segment of Lidar Data. This variable has a slight correction applied to it.

Comments: Not valid if APID19 is missing.

Product Var Name i\_Rng2CDProf\_Cor

Is element of: GLA07 Record

Short Description: Start Range of 1064 nm Backscatter Profile

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50000000

Product Maximum: 70000000

Description: The range from the spacecraft to the start of the 1064 nm backscatter profile - the start of the 20 KM segment of Lidar Data. This variable has a slight correction applied to it.

Comments:

Product Var Name i1\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532nm Background at 1 Hz

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals. (3) is background used to compute NRB. Averaged over 40 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i5\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Background at 5 Hz

Product Data Type: i4b (4, 5)

Total Bytes: 80

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i40\_g\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Background at 40 Hz

Product Data Type: i4b (4, 40)

Total Bytes: 640

Product Units: photons/bin \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: The normalized 532 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.

Comments: Not valid if APID15 is missing.

Product Var Name i5\_ir\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Background at 5 Hz

Product Data Type: i4b (4, 5)

Total Bytes: 80

Product Units: W\*1.0d17

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000000

Product Maximum: 100000000

Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB. Averaged over 8 shots.

Comments: Not valid if APID15 is missing.

Product Var Name i40\_ir\_bg

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Background at 40 Hz

Product Data Type: i4b (4, 40)

Total Bytes: 640

Product Units: W\*1.0d17

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100000000

Product Maximum: 100000000

Description: The normalized 1064 nm background counts from upper (1) and lower (2) integration intervals.(3) is background used to compute NRB.

Comments: Not valid if APID17 is missing.

Product Var Name i5\_g\_TxNrg\_EU

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy at 5 Hz

Product Data Type: i4b (5)

Total Bytes: 20

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4500

Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor. Averaged over 8 shots.

Comments: Not valid if APID19 is missing.

Product Var Name i40\_g\_TxNrg\_EU

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy at 40 Hz

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4500

Description: The 532 nm transmitted pulse energy in energy units, converted from the counts from the transmitted energy monitor.

Comments: Not valid if APID19 is missing.

Product Var Name i5\_ir\_TxNrgEU

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy at 5 Hz

Product Data Type: i4b (5)

Total Bytes: 20

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 9000

Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature. Averaged over 8 shots.

Comments: Not valid if APID19 and APID12 or APID13 are missing.

Product Var Name i40\_ir\_TxNrgEU



Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy at 40 Hz

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Joules \* 1.0d5

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 9000

Description: The 1064 nm laser pulse energy, computed from the digitized outgoing pulse and the detector temperature.

Comments: Not valid if APID19 and APID12 or APID13 are missing.

Product Var Name i\_g\_TxNrg\_qf

Is element of: GLA02 Record, GLA07 Record

Short Description: 532 nm Laser Transmit Energy Quality Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: Evaluation of the 532 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.

Please see <a href='flags/i\_g\_TxNrg\_qf.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_ir\_TxNrg\_qf

Is element of: GLA02 Record, GLA07 Record

Short Description: 1064 nm Laser Transmit Energy Quality Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: Evaluation of the 1064 nm laser transmit energy which is an indication of the laser health; 2 bits per shot for 40 shots; 1 = full laser energy, 2 = marginal laser energy, 3 = deficient laser energy, 0 = not used.

Please see <a href='flags/i\_ir\_TxNrg\_qf.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_atm\_dem

Is element of: GLA07 Record

Short Description: DEM value at current location from 1 km x 1 km grid

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32768

Product Maximum: 32768

Description: Surface height value for current location from 1 km x 1 km grid

Comments:

Product Var Name i\_metFlg

Is element of: GLA07 Record

Short Description: Met/std atm source/quality flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Flag indicating if met data or standard atmosphere data are used to fill met profiles. Flag is set to 1 if time of first file > 24 hrs, 2 if time of second file > 24 hrs, 2+index of standard atmosphere file if time of both files > 24 hrs.

Please see <a href='flags/i\_metFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_ir\_bin\_shift

Is element of: GLA07 Record

Short Description: 1064 vertical alignment offset

Product Data Type: i1b

Total Bytes: 1

Product Units: bins

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10

Product Maximum: 10

Description: Number of bins that 1064 nm surface return bin is shifted to align with 532 nm surface return bin.

Comments:

Product Var Name i\_Spare2

Is element of: GLA07 Record

Short Description: Spare 2

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA07 spare2.

Product Var Name i\_g\_cal\_cof

Is element of: GLA07 Record

Short Description: 532 nm Backscatter Calibration Coefficient

Product Data Type: i4b (3)

Total Bytes: 12

Product Units:  $1d-6 \text{ (Photons/bin)(km}^3\text{/J)sr}$

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1.0d4

Product Maximum: 1.0d9

Description: The calibration value applied to the 532 nm lidar data to get the backscatter (1=high cal ht, 2=low cal ht, 3=used).

Comments:

Product Var Name i\_ir\_cal\_cof

Is element of: GLA07 Record

Short Description: 1064 nm Backscatter Calibration Coefficient

Product Data Type: i4b (2)

Total Bytes: 8

Product Units:  $1d4 \cdot (\text{Watts}) / (\text{km}^3 / \text{J}) \text{sr}$

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1.0d5

Product Maximum: 1.0d8

Description: The calibration value applied to the 1064 nm lidar data to get the backscatter (1=low cal ht, 2=used).

Comments:

Product Var Name i5\_g\_bscs

Is element of: GLA07 Record

Short Description: 532 nm Merged Attenuated Backscatter Profile 40 to -1 km

Product Data Type: i4b (548, 5)

Total Bytes: 10960

Product Units:  $e11 / (\text{m} \cdot \text{sr})$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000000000

Description: For the full vertical atmospheric profile (-1 to 41 km), the atmosphere 532 nm calibrated, attenuated backscatter profile at the rate of 5 per 1 second. When the 532 nm data becomes saturated the 1064 nm data is converted and merged into the data set. The Level 1A data that occurs at 40/second, every 8 shots are averaged and stored in the profile and the 1/second is replicated to get the full 5 Hz rate on this product.

Comments:

Product Var Name i40\_g\_bscs

Is element of: GLA07 Record

Short Description: 532 nm Merged Attenuated Backscatter Profile 10 to -1 km

Product Data Type: i4b (148, 40)

Total Bytes: 23680

Product Units:  $e11 / (\text{m} \cdot \text{sr})$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000000000

Description: For the 10 KM to -1 KM vertical segment, the atmosphere 532 nm calibrated, attenuated backscatter profile at the 40 per 1 second rate. When the 532 nm data becomes saturated the 1064 nm data is converted to 532 data and merged into the data set.

Comments:

Product Var Name i5\_ir\_bscs

Is element of: GLA07 Record

Short Description: 1064 nm Attenuated Backscatter Profile 20 to -1 km

Product Data Type: i4b (280, 5)

Total Bytes: 5600

Product Units: e11/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000000000

Description: Atmosphere 1064 nm calibrated, attenuated backscatter profile (-1 to 20 km) at the rate of 5 per 1 second. Averages of 8 shots are used for the Level 1A data that occurs at 40/second rate.

Comments:

Product Var Name i40\_ir\_bscs

Is element of: GLA07 Record

Short Description: 1064 nm Attenuated Backscatter Profile 10 to -1 km

Product Data Type: i4b (148, 40)

Total Bytes: 23680

Product Units: e11/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000000000

Description: Atmosphere 1064 nm calibrated, attenuated backscatter profile (-1 to 10 km) at the rate of 40 per 1 second.

Comments:

Product Var Name i\_g\_mbscs

Is element of: GLA07 Record

Short Description: 532 nm molecular backscatter cross section profile 40 to -1 km

Product Data Type: i4b (548)

Total Bytes: 2192

Product Units: e11/(m-sr)

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1000

Product Maximum: 1000000

Description: 532 nm molecular backscatter profile computed from MET data interpolated in space and time to profile location.

Comments:

Product Var Name i\_ir\_mbscs

Is element of: GLA07 Record

Short Description: 1064 nm molecular backscatter cross section profile 20 to -1 km

Product Data Type: i4b (280)

Total Bytes: 1120

Product Units: e11/(m-sr)

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1000

Product Maximum: 1000000

Description: 1064 nm molecular backscatter profile computed from MET data interpolated in space and time to profile location.

Comments:

Product Var Name i1\_int\_ret

Is element of: GLA07 Record

Short Description: 532 nm integrated return from 40 to 20 km

Product Data Type: i4b

Total Bytes: 4

Product Units: e11/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 200000

Product Maximum: 100000000

Description: The integrated or summed 532 attenuated backscatter profile from 40 to 20 km. When normalized by the sum of the molecular backscatter for the same interval, gives an indication of data quality

Comments:

Product Var Name i40\_g\_sat\_prof

Is element of: GLA07 Record

Short Description: 532 nm Saturation Flag Profile 10 to -1 km

Product Data Type: i1b (740)

Total Bytes: 740

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: 532 nm Saturation Flag Profile from 10 to -1 km. Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data. 0 = not saturated, 1 = saturated.

Please see <a href='flags/i40\_g\_sat\_prof.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i5\_g\_sat\_prof

Is element of: GLA07 Record

Short Description: 532 nm Saturation Flag Profile 40 to -1 km

Product Data Type: i1b (343)

Total Bytes: 343

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: 532 nm Saturation Flag Profile from 41 to -1 km. Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data. 0 = not saturated, 1 = saturated.

Please see <a href='flags/i5\_g\_sat\_prof.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare3

Is element of: GLA07 Record

Short Description: Spares

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_532AttBS\_Flag

Is element of: GLA07 Record

Short Description: 532 nm Attenuated Backscatter Vertical Profile Flag

Product Data Type: i1b (18)

Total Bytes: 18

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_532AttBS\_Flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_1064AttBS\_Flag

Is element of: GLA07 Record

Short Description: 1064 nm Attenuated Backscatter Vertical Profile Flag

Product Data Type: i1b (18)

Total Bytes: 18

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_1064AttBS\_Flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg3

Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude Flag 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Please see <a href='flags/i\_AttFlg3.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_DitheringEnabledFlag

Is element of: GLA02 Record, GLA07 Record

Short Description: Dithering Enabled Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 1

Description: 0=FALSE, 1=TRUE

Comments: Not valid if APID15 is missing.

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA07 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description:

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA07 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description:

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA07 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description:

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA07 Record, GLA15 Record

Short Description: Surface Wind Speed

Product Data Type: i2b

Total Bytes: 2

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA07 Record, GLA15 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_spare4

Is element of: GLA07 Record

Short Description: Spare 4

Product Data Type: i1b (130)

Total Bytes: 130

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_beam\_coelev

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Co-elevation

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Azimuth

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Azimuth (Az) is the direction clockwise from north of the laser beam as seen by an observer at the laser ground spot.

Comments:

Product Var Name i\_pad\_angle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: PAD Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600000000

Description: Attitude angle calculated from PAD and POD. Comments:

Product Var Name i\_spare0

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Spares 0

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_lat

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Latitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_lon

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Longitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Orbit flag

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see [flags/i\\_OrbFlg.pdf](flags/i_OrbFlg.pdf) the PDF flag description in the next section for more details.

There are 4 sets of this flag value, 1/sec for each of the 4 sec covered in the record.

Comments:

Product Var Name i\_surfType

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Region Type

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <[a href='\"/flags/i\\_surfType.pdf\"'](\"/flags/i_surfType.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_LidarQF

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Lidar Frame quality flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <[a href='\"/flags/i\\_LidarQF.pdf\"'](\"/flags/i_LidarQF.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_atm\_dem

Is element of: GLA08 Record

Short Description: DEM value at current location from 1 km x 1 km grid

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32768

Product Maximum: 32768

Description: Surface height value for current location from 1 km x 1 km grid



## Comments:

Product Var Name i4\_aer\_bot

Is element of: GLA08 Record

Short Description: Below 20 KM Aerosol Layer Bottom at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: deka-meters

Invalid Value/Flag: i4\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: The aerosol layer bottoms (below 20 KM in atmosphere) for up to 5 layers at 1 per 4 sec.

## Comments:

Product Var Name i4\_aer\_top

Is element of: GLA08 Record

Short Description: Below 20 KM Aerosol Layer Top at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: deka-meters

Invalid Value/Flag: i4\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: The aerosol layer tops (below 20 KM in atmosphere) for up to 5 layers at 1 per 4 sec.

## Comments:

Product Var Name i20\_aer\_bot

Is element of: GLA08 Record

Short Description: 20-40 KM Aerosol Layer Bottom at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: deka-meters

Invalid Value/Flag: i20\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1000

Product Maximum: 4000

Description: The aerosol layer bottoms (20 - 40 KM in atmosphere) for up to 3 layers at 1 per 4 sec.

Comments:

Product Var Name i20\_aer\_top

Is element of: GLA08 Record

Short Description: 20-40 KM Aerosol Layer Top at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: deka-meters

Invalid Value/Flag: i20\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1000

Product Maximum: 4000

Description: The aerosol layer tops (20 - 40 KM in atmosphere) for up to 3 layers at 1 per 4 sec.

Comments:

Product Var Name i\_LRpbl\_ht

Is element of: GLA08 Record

Short Description: Low Resolution PBL Height at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 700

Description: Low resolution height of the planetary boundary layer, as derived from the aerosol structure; the low resolution data is averaged over 4 seconds.

Comments:

Product Var Name i\_LRpbl\_grd

Is element of: GLA08 Record

Short Description: Ground Detection for Low Res PBL at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description: The height above the reference ellipsoid of the ground used by the low res PBL processing algorithms.

Comments:

Product Var Name i\_HRpbl\_ht

Is element of: GLA08 Record

Short Description: High Resolution PBL Height at 532 nm

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 700

Description: High resolution height of the planetary boundary layer, as derived from the aerosol structure; the high resolution data occurs at the rate of 5 per second.

Comments:

Product Var Name i\_HRpbl\_grd

Is element of: GLA08 Record

Short Description: Ground Detection for High Res PBL

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description: The height above the reference ellipsoid of the ground used by the high res PBL processing algorithms.

Comments:

Product Var Name i4\_aer\_pct

Is element of: GLA08 Record

Short Description: Percentage of Saturated Bins in Below 20 KM Aerosol Layers at 532 nm

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: unitless

Invalid Value/Flag: i4\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Percentage of Saturated Bins in Below 20 KM Aerosol Layers at 532 nm

Comments:

Product Var Name i20\_aer\_pct

Is element of: GLA08 Record

Short Description: Percentage of Saturated Bins in 20-40 KM Aerosol Layers at 532 nm

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: unitless

Invalid Value/Flag: i20\_aer\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Percentage of Saturated Bins in 20-40 KM Aerosol Layers at 532 nm

Comments:

Product Var Name i\_LRpbl\_pct

Is element of: GLA08 Record

Short Description: Percentage of Saturated Bins in Low Resolution PBL Layer at 532 nm

Product Data Type: i1b

Total Bytes: 1

Product Units: unitless

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Percentage of Saturated Bins in Low Resolution PBL Layer at 532 nm

Comments:

Product Var Name i\_LayHgt\_Flag

Is element of: GLA08 Record

Short Description: Layer Height Flag

Product Data Type: i1b (32)

Total Bytes: 32

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <[a href='\"#\"'>flags/i\\_LayHgt\\_Flag.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg3

Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude Flag 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Please see <[a href='\"#\"'>flags/i\\_AttFlg3.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see [flags/i\\_timecorflg.pdf](flags/i_timecorflg.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_SolarAngle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Solar Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: micro-degrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_Aer\_top\_b20\_temp

Is element of: GLA08 Record

Short Description: Temperature of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_top\_b20\_pres

Is element of: GLA08 Record

Short Description: Pressure of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_top\_b20\_relh

Is element of: GLA08 Record

Short Description: Relative Humidity of Top of Aerosol Layers in Bottom 20km of Atm at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_b20\_temp

Is element of: GLA08 Record

Short Description: Temperature of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_b20\_pres

Is element of: GLA08 Record

Short Description: Pressure of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_b20\_relh

Is element of: GLA08 Record

Short Description: Relative Humidity of Bottom of Aerosol Layers in Bottom 20km of Atm at 532 nm

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Aerosol Layers in Bottom 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_top\_a20\_temp

Is element of: GLA08 Record

Short Description: Temperature of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_top\_a20\_pres

Is element of: GLA08 Record

Short Description: Pressure of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm



Product Data Type: i2b (3)

Total Bytes: 6

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_top\_a20\_relh

Is element of: GLA08 Record

Short Description: Relative Humidity of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_a20\_temp

Is element of: GLA08 Record

Short Description: Temperature of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_a20\_pres

Is element of: GLA08 Record

Short Description: Pressure of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_a20\_relh

Is element of: GLA08 Record

Short Description: Relative Humidity of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Aerosol Layers Above 20km of Atmosphere at 532 nm

Comments:

Product Var Name i\_Aer\_PBL\_LR\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Aer\_PBL\_LR\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Aer\_PBL\_LR\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Aer\_ir\_top

Is element of: GLA08 Record, GLA11 Record

Short Description: Elevation of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Top of Aerosol Layers detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot

Is element of: GLA08 Record, GLA11 Record

Short Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm.

Comments:

Product Var Name i\_Aer\_ir\_layflg

Is element of: GLA08 Record

Short Description: Layer Flag for 1064 Aerosol

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Please see <a href='flags/i\_Aer\_ir\_layflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Aer\_ir\_top\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_top\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_top\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Surface Temperature, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Pressure

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Pressure, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Relative Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Surface Relative Humidity, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Speed

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Wind Speed, 4 of 1-second intervals. Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Surface wind direction azimuth from North, 4 of 1-second intervals. Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_PBL\_Layer\_ht

Is element of: GLA08 Record, GLA09 Record

Short Description: PBL Layer Height from Met Data

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description:

Comments:



Product Var Name i\_Spec\_Humid

Is element of: GLA08 Record, GLA09 Record

Short Description: Specific Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: gram/kilogram\*100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Specific humidity 2m above ground.

Comments:

Product Var Name i\_Temp2mAbvGrnd

Is element of: GLA08 Record, GLA09 Record

Short Description: Temperature 2m Above Ground Level

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description:

Comments:

Product Var Name i\_Total\_CloudCov

Is element of: GLA08 Record, GLA09 Record

Short Description: Total Cloud Cover

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

## Comments:

Product Var Name i\_spare2

Is element of: GLA08 Record

Short Description: Spares

Product Data Type: i1b (232)

Total Bytes: 232

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA08 spare2.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole

number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_beam\_coelev

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Co-elevation

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Azimuth

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Azimuth (Az) is the direction clockwise from north of the laser beam as seen by an observer at the laser ground spot.

Comments:

Product Var Name i\_pad\_angle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: PAD Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600000000

Description: Attitude angle calculated from PAD and POD.

Comments:

Product Var Name i\_spare0

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Spares 0

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see [the PDF flag description in the next section](\"flags/i_AttFlg1.pdf\") for more details.

Comments:

Product Var Name i\_lat

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Latitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_lon

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Longitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Orbit flag

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

There are 4 sets of this flag value, 1/sec for each of the 4 sec covered in the record.

Comments:

Product Var Name i\_surfType

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Region Type

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <a href='flags/i\_surfType.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_LidarQF

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Lidar Frame quality flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_LidarQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare2

Is element of: GLA09 Record

Short Description: Spare 2

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA09 spare2.

Product Var Name i\_topo\_elev

Is element of: GLA09 Record

Short Description: Topographic elevation of surface above geoid

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 32000

Description: Topographic elevation of surface above geoid based upon POD, PAD, and geoid

Comments:

Product Var Name i\_atm\_dem

Is element of: GLA09 Record

Short Description: DEM value at current location from 1 km x 1 km grid

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32768

Product Maximum: 32768

Description: Surface height value for current location from 1 km x 1 km grid

Comments:

Product Var Name i\_LRcld\_bot

Is element of: GLA09 Record

Short Description: Low Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: deka-meters

Invalid Value/Flag: i\_LRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Low resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The low resolution data occurs at the rate of once per 4 seconds.

Comments:

Product Var Name i\_LRcld\_top

Is element of: GLA09 Record

Short Description: Low Resolution Cloud Top at 532 nm

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: deka-meters

Invalid Value/Flag: i\_LRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Low resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The low resolution data occurs at the rate of once per 4 seconds.

Comments:

Product Var Name i\_LRcld\_grd

Is element of: GLA09 Record

Short Description: Low Resolution Ground Detection at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No



Product Minimum: -127

Product Maximum: 1000

Description: The height from the reference ellipsoid of the ground as detected by the low resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.

Comments:

Product Var Name i\_spare3

Is element of: GLA09 Record

Short Description: Spares

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_MRcld\_bot

Is element of: GLA09 Record

Short Description: Medium Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: i\_MRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The medium resolution data occurs at the rate of once per second.

Comments:

Product Var Name i\_MRcld\_top

Is element of: GLA09 Record

Short Description: Medium Resolution Cloud Top at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: i\_MRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The medium resolution data occurs at the rate of once per second.

Comments:

Product Var Name i\_MRcld\_grd

Is element of: GLA09 Record

Short Description: Medium Resolution Ground Detection at 532 nm

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 1000

Description: The height above the reference ellipsoid of the ground as detected by the medium resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.

Comments:

Product Var Name i\_MRcld\_pct

Is element of: GLA09 Record

Short Description: Percentage of Saturated Bins in Medium Resolution Cloud Layers at 532 nm

Product Data Type: i1b (10, 4)

Total Bytes: 40

Product Units: unitless

Invalid Value/Flag: i\_MRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Percentage of saturated bins in medium resolution cloud layers

Comments:

Product Var Name i\_HRcld\_bot

Is element of: GLA09 Record

Short Description: High Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (10, 20)

Total Bytes: 400

Product Units: deka-meters

Invalid Value/Flag: i\_HRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: High resolution height above the reference ellipsoid of the bottom of a cirrus, thin, or dense cloud layer below 10KM in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The high resolution data occurs at the rate of 5 per second.

Comments:

Product Var Name i\_HRcld\_top

Is element of: GLA09 Record

Short Description: High Resolution Cloud Top at 532 nm

Product Data Type: i2b (10, 20)

Total Bytes: 400

Product Units: deka-meters

Invalid Value/Flag: i\_HRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: High resolution height above the reference ellipsoid of the top of a cirrus, thin, or dense cloud layer below 10 KM in the atmosphere. There can be up to 10 cloud layers in an atmospheric profile. The high resolution data occurs at the rate of 5 per second.

Comments:

Product Var Name i\_HRcld\_grd

Is element of: GLA09 Record

Short Description: High Resolution Ground Detection at 532 nm

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 1000

Description: The height above the reference ellipsoid of the ground as detected by the high resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.

Comments:

Product Var Name i\_FRcld\_bot

Is element of: GLA09 Record

Short Description: Full Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (160)

Total Bytes: 320

Product Units: deka-meters

Invalid Value/Flag: i\_FRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 400

Description: The height above the reference ellipsoid to the bottom of the full resolution cloud layer (40 Hz). This resolution cloud search is independent of the lower resolution cloud search results and is done for each 40 Hz shot regardless of whether or not clouds were detected at the lower resolutions. Note that the 40 Hz data is available only below 10 km, and thus clouds existing above that level cannot be detected at the 40 Hz resolution.

Comments:

Product Var Name i\_FRcld\_top

Is element of: GLA09 Record

Short Description: Full Resolution Cloud Top at 532 nm

Product Data Type: i2b (160)

Total Bytes: 320

Product Units: deka-meters

Invalid Value/Flag: i\_FRC\_af

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 400

Description: The height above the reference ellipsoid to the top of the full resolution cloud layer (40 Hz). This resolution cloud search is independent of the lower resolution cloud search results and is done for each 40 Hz shot regardless of whether or not clouds were detected at the lower resolutions. Note that the 40 Hz data is available only below 10 km, and thus clouds existing above that level cannot be detected at the 40 Hz resolution.

Comments:

Product Var Name i\_FRcld\_grd

Is element of: GLA09 Record

Short Description: Full Resolution Cloud Ground Detection at 532 nm

Product Data Type: i2b (160)

Total Bytes: 320

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 1000

Description: The height above the reference ellipsoid of the ground as detected by the full resolution cloud processing algorithms. A value of -127 indicates that the ground was searched for, but not detected.

Comments:

Product Var Name i\_FRg\_grd\_sig

Is element of: GLA09 Record

Short Description: Full Resolution Ground Return Signal at 532 nm

Product Data Type: i4b (160)

Total Bytes: 640

Product Units: e9/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 10000

Product Maximum: 10000000

Description: Ground return signal from the 532 nm backscatter profile at the height that the ground return is detected.

Comments:

Product Var Name i\_FRir\_grd\_sig

Is element of: GLA09 Record

Short Description: Full Resolution Ground Return Signal at 1064 nm

Product Data Type: i4b (160)

Total Bytes: 640

Product Units: e9/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100000

Product Maximum: 10000000

Description: Ground return signal from the 1064 nm backscatter profile at the height that the ground return is detected.

Comments:

Product Var Name i\_LRCL\_Flag

Is element of: GLA09 Record

Short Description: Low Resolution Cloud Layers Flag for 532 nm

Product Data Type: i1b (11)

Total Bytes: 11

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_LRCL\_Flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_MRCL\_Flag

Is element of: GLA09 Record

Short Description: Medium Resolution Cloud Layers Flag for 532 nm

Product Data Type: i1b (37)

Total Bytes: 37

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_MRCL\_Flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_HRCL\_Flag

Is element of: GLA09 Record

Short Description: High Resolution Cloud Layers Flag for 532 nm

Product Data Type: i1b (185)

Total Bytes: 185

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <[a href='\"/flags/i\\_HRCL\\_Flag.pdf\"'](\"/flags/i_HRCL_Flag.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_FRCL\_Flag

Is element of: GLA09 Record

Short Description: Full Resolution Cloud Layers Flag for 532 nm

Product Data Type: i1b (220)

Total Bytes: 220

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <[a href='\"/flags/i\\_FRCL\\_Flag.pdf\"'](\"/flags/i_FRCL_Flag.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg3

Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude Flag 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Please see <[a href='\"/flags/i\\_AttFlg3.pdf\"'](\"/flags/i_AttFlg3.pdf\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see [the PDF flag description in the next section](flags/i_timecorflg.pdf) for more details.

Comments:

Product Var Name i\_FRir\_cldtop

Is element of: GLA09 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (160)

Total Bytes: 320

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 4 second record. Also parameter is in GLA06, 12-15.

Comments:

Product Var Name i\_FRir\_qaFlag

Is element of: GLA09 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see [the PDF flag description in the next section](flags/i_FRir_qaFlag.pdf) for more details.

Comments:

Product Var Name i\_FRir\_intsig



Is element of: GLA09 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (160)

Total Bytes: 320

Product Units:  $e7/(m\text{-}sr)$

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of  $1.0e-7$  ( $1/(m\text{-}sr)$ ). This parameter is for a 4 second record. This parameter is also in GLA06, 12-15.

Comments:

Product Var Name i\_SolarAngle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Solar Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: micro-degrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_LRir\_cld\_top

Is element of: GLA09 Record

Short Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of top of cloud layers detected in 1064 nm at low resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cld\_bot

Is element of: GLA09 Record

Short Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_QAflag

Is element of: GLA09 Record

Short Description: Low Resolution 1064 nm Cloud Layer QA Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 256

Description: Low Resolution 1064 nm Cloud Layer QA Flag. Composite Flag - see Breakout for details

Please see <[a href='\"flags/i\\_LRir\\_QAflag.pdf\"'](\"flags/i_LRir_QAflag.pdf\")> the PDF flag description in the next section for more details.

The data is arranged in 10 bytes. Within the 10 bytes:

bytes 1-4 are spares

byte 5 leaves bits 4-7 as spare, and stores the af availability flag in

bits 0-3; it provides the number of cloud layers determined  
from 1064 nm data, with 0=layers searched for but not  
detected and 15=cloud layers not searched for

bytes 6-10 are 10 flags, each 4 bits in length giving a quality flag;

15=cloud layers were not searched for, 0=cloud layers searched  
for but not detected, 1= low chance of being a cloud,

2=moderate, 3=high, 4=no doubt

Comments:

Product Var Name i\_LRir\_cldtop\_temp

Is element of: GLA09 Record

Short Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cldtop\_pres

Is element of: GLA09 Record

Short Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cldtop\_relh

Is element of: GLA09 Record

Short Description: Relative Humidity of Top of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cldbot\_temp

Is element of: GLA09 Record

Short Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cldbot\_pres

Is element of: GLA09 Record

Short Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_LRir\_cldbot\_relh

Is element of: GLA09 Record

Short Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm Low Resolution

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm Low Resolution data rate (1 per 4 sec).

Comments:

Product Var Name i\_MRir\_cld\_top

Is element of: GLA09 Record, GLA11 Record

Short Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cld\_bot

Is element of: GLA09 Record, GLA11 Record

Short Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_QAflag

Is element of: GLA09 Record, GLA11 Record

Short Description: Medium Resolution 1064 nm Cloud Layer QA Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 1064 nm Cloud Layer QA Flag. Composite Flag - see Breakout for details

Please see <a href='flags/i\_MRir\_QAflag.pdf'> the PDF flag description in the next section for more details.

The data is arranged in 40 bytes.

bytes 1-18 are spares:

bytes 19-20 are af flags: The 4 'af' flags (4 bits each) are concatenated with the QAflag storage and are contained in bytes 19-20 starting at bit 0 of byte 20.

bytes 21-40 are QAflags: The QAflag portion has been stored such that interval 1 is in bytes 40-36, interval 2 in bytes 35-31, interval 3 in bytes 30-26, and interval 4 in bytes 25-21. Each of the 10 layer flags per interval is 4 bits in length as before, such that interval 1 layer 1 is in bits 0-3 and interval 1 layer 2 is in bits 4-7 of byte 40, interval 1 layer 3 is in bits 0-3 and interval 1 layer 4 is in bits 4-7 of byte 39, etc.

Quality flag value 15=cloud layers were not searched for; 0=cloud layers were searched but not detected; 1-14 indicate increasing confidence of good cloud retrieval (value 1=least confidence, value 14=greatest confidence).

Availability flag value 15=cloud layers not searched for; 0=layers searched for but not detected.

Comments:

Product Var Name i\_MRir\_cldtop\_temp

Is element of: GLA09 Record, GLA11 Record

Short Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldtop\_pres

Is element of: GLA09 Record, GLA11 Record

Short Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldtop\_relh

Is element of: GLA09 Record, GLA11 Record

Short Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_temp

Is element of: GLA09 Record, GLA11 Record

Short Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_pres

Is element of: GLA09 Record, GLA11 Record

Short Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_relh

Is element of: GLA09 Record, GLA11 Record

Short Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at MR

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_LRg\_cldtop\_temp

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Top Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Low Resolution 532 nm Cloud Top Temperature

Comments:



Product Var Name i\_LRg\_cldtop\_pres

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Top Pressure

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Low Resolution 532 nm Cloud Top Pressure

Comments:

Product Var Name i\_LRg\_cldtop\_relh

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Top Relative Humidity

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Low Resolution 532 nm Cloud Top Relative Humidity

Comments:

Product Var Name i\_LRg\_cldbot\_temp

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Bottom Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Low Resolution 532 nm Cloud Bottom Temperature

## Comments:

Product Var Name i\_LRg\_cldbot\_pres

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Bottom Pressure

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Low Resolution 532 nm Cloud Bottom Pressure

## Comments:

Product Var Name i\_LRg\_cldbot\_relh

Is element of: GLA09 Record

Short Description: Low Resolution 532 nm Cloud Bottom Relative Humidity

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Low Resolution 532 nm Cloud Bottom Relative Humidity

## Comments:

Product Var Name i\_MRg\_cldtop\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Temperature

Comments:

Product Var Name i\_MRg\_cldtop\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Top Pressure

Comments:

Product Var Name i\_MRg\_cldtop\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Comments:

Product Var Name i\_MRg\_cldbot\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Temperature

Comments:

Product Var Name i\_MRg\_cldbot\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Bottom Pressure

Comments:

Product Var Name i\_MRg\_cldbot\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

Comments:

Product Var Name i\_LRg\_SourceFt

Is element of: GLA09 Record

Short Description: Low Resolution Data 532 nm Source Function

Product Data Type: i2b

Total Bytes: 2

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Low Resolution Data 532 nm Source Function

Comments:

Product Var Name i\_MRg\_SourceFt

Is element of: GLA09 Record

Short Description: Medium Resolution Data 532 nm Source Function

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Medium Resolution Data 532 nm Source Function

Comments:

Product Var Name i\_HRg\_SourceFt

Is element of: GLA09 Record

Short Description: High Resolution Data 532 nm Source Function

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: High Resolution Data 532 nm Source Function

Comments:

Product Var Name i\_LRir\_SourceFt

Is element of: GLA09 Record

Short Description: Low Resolution Data 1064 nm Source Function

Product Data Type: i2b

Total Bytes: 2

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Low Resolution Data 1064 nm Source Function

Comments:

Product Var Name i\_MRir\_SourceFt

Is element of: GLA09 Record

Short Description: Medium Resolution Data 1064 nm Source Function

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Medium Resolution Data 1064 nm Source Function

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Surface Temperature, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Pressure

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Pressure, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Relative Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Surface Relative Humidity, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Speed

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Wind Speed, 4 of 1-second intervals. Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Surface wind direction azimuth from North, 4 of 1-second intervals. Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_PBL\_Layer\_ht

Is element of: GLA08 Record, GLA09 Record

Short Description: PBL Layer Height from Met Data

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description:

Comments:

Product Var Name i\_Spec\_Humid

Is element of: GLA08 Record, GLA09 Record

Short Description: Specific Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: gram/kilogram\*100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Specific humidity 2m above ground. Comments:



Product Var Name i\_Temp2mAbvGrnd

Is element of: GLA08 Record, GLA09 Record

Short Description: Temperature 2m Above Ground Level

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description:

Comments:

Product Var Name i\_Total\_CloudCov

Is element of: GLA08 Record, GLA09 Record

Short Description: Total Cloud Cover

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

Comments:

Product Var Name i\_blow\_snow\_ht

Is element of: GLA09 Record

Short Description: Blowing Snow Height

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: meters \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Represents the maximum height above the surface of the blowing snow layer.

Comments:

Product Var Name i\_blow\_snow\_od

Is element of: GLA09 Record

Short Description: Blowing Snow Optical Depth

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: unitless \* 1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: An estimate of the optical depth of the blowing snow layer.

Comments:

Product Var Name i\_blow\_snow\_erd

Is element of: GLA09 Record

Short Description: Blowing Snow Range Delay

Product Data Type: i2b (20)

Total Bytes: 40

Product Units: millimeters \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: An estimate of the range delay caused by blowing snow.

Comments:

Product Var Name i\_blow\_snow\_conf

Is element of: GLA09 Record

Short Description: Blowing Snow Confidence

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 15

Description: A number that indicates the degree of confidence that this is indeed blowing snow. Blowing snow confidence ranges from 0 - 15 and has the following meanings:<br>

<br>

0: profile tested, but no blowing snow detected<br>

1 - 5: Good blowing snow detection using the 1064 channel. 1 is lowest confidence that layer is blowing snow, 5 is highest confidence.<br>

6: Layer suspected of being low cloud (such as fog), or seemingly too thick to be blowing snow (> 1.0 km thick) as determined from 1064 channel.<br>

7 - 12: Good blowing snow detection using the 532 channel. 7 is lowest confidence that layer is blowing snow, 12 is highest confidence.<br>

13: Layer suspected of being low cloud (such as fog), or seemingly too thick to be blowing snow (> 1.0 km thick) as determined from 532 channel.<br>

14: Wind speed < 5 m/s or ground stroke not detected (the latter case indicating overlying thick cloud)<br>

15: Signal not examined for blowing snow (could be because it is closer to the equator than plus or minus 60 degrees latitude, or not over sea ice or land)

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA09 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere<br>

0 clear <br>

1 high cloud (> 5 km) low optical depth<br>

2 high cloud (> 5 km), high optical depth<br>

3 mid cloud (>2, <=5 km) low optical depth<br>

4 mid cloud (>2, <=5 km) high optical depth<br>

5 low cloud (> 500 m, <=2 km), low optical depth<br>

6 low cloud (> 500 m, <=2 km), high optical depth<br>

7 blowing snow or fog (< 500 m), low optical depth<br>

8 blowing snow or fog (< 500 m), high optical depth<br>

9 not tested<br>

10 data quality insufficient to assign flag <br>

## Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA09 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag<br>

Comments: 0 Not applicable (for contamination flag values of 9 or 10)<br>

1 low confidence<br>

2 reasonable confidence<br>

3 high confidence<br>

Product Var Name i\_spare4

Is element of: GLA09 Record

Short Description: Spare 4

Product Data Type: i1b (402)

Total Bytes: 402

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA09 Spare4

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_beam\_coelev

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Co-elevation

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

## Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Azimuth

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Azimuth (Az) is the direction clockwise from north of the laser beam as seen by an observer at the laser ground spot.

## Comments:

Product Var Name i\_pad\_angle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: PAD Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600000000

Description: Attitude angle calculated from PAD and POD.

## Comments:

Product Var Name i\_spare0

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Spares 0

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see [flags/i\\_AttFlg1.pdf](\"flags/i_AttFlg1.pdf\") the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_lat

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Latitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_lon

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Longitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Orbit flag

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

There are 4 sets of this flag value, 1/sec for each of the 4 sec covered in the record.

Comments:

Product Var Name i\_surfType

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Region Type

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <a href='flags/i\_surfType.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_LidarQF



Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Lidar Frame quality flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see [flags/i\\_LidarQF.pdf](flags/i_LidarQF.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_cld1\_bs\_prof

Is element of: GLA10 record

Short Description: Cloud Backscatter Cross Section Profile at 532 nm

Product Data Type: i4b (280, 4)

Total Bytes: 4480

Product Units: e10/(m-sr)

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 100000000

Description: 532 nm cloud backscatter cross section corrected for attenuation, from 20 to -1km at 1hz. The first 4\*280 bytes refer to the profile at the first second.

Comments:

Product Var Name i\_cld1\_ext\_prof

Is element of: GLA10 record

Short Description: Cloud Extinction Cross Section Profile at 532 nm

Product Data Type: i4b (280, 4)

Total Bytes: 4480

Product Units: e9/m

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000000

Product Maximum: 1000000000

Description: Cloud extinction cross section profile from 20 to -1km at 1hz calculated from the 532 nm data. The first 4\*280 bytes refer to the profile at the first second.

Comments:

Product Var Name i\_aer4\_bs\_prof

Is element of: GLA10 record

Short Description: Aerosol Backscatter Cross Section Profile at 532nm

Product Data Type: i4b (548)

Total Bytes: 2192

Product Units:  $e10/(m\cdot sr)$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 100000000

Description: 532 nm aerosol backscatter cross section from 40 to -1km at 0.25hz. The 4\*548 bytes refer to the profile at the four second interval.

Comments:

Product Var Name i\_aer4\_ext\_prof

Is element of: GLA10 record

Short Description: Aerosol Extinction Cross Section Profile at 532 nm

Product Data Type: i4b (548)

Total Bytes: 2192

Product Units:  $e9/m$

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000000

Product Maximum: 1000000000

Description: Aerosol extinction cross section profile for 40 to -1km calculated from the 532 nm data at 0.25hz. The 4\*548 bytes refer to the profile at the four second interval.

Comments:

Product Var Name i\_cld1\_sval1

Is element of: GLA10 record

Short Description: Cloud true S values from table

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units:  $100\cdot sr$

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100

Product Maximum: 20000

Description: Cloud true extinction to backscatter ratios calculated from meteorological and geographic data. The first set of 2\*10 bytes refers to the 10 possible layers at the first second.

Comments:

Product Var Name i\_cld1\_sval2

Is element of: GLA10 record

Short Description: Cloud true S values from equation calc.

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: 100\*sr

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100

Product Maximum: 20000

Description: Cloud true extinction to backscatter ratios calculated from optically thin layer considerations. The first set of 2\*10 bytes refers to the 10 possible layers at the first second.

Comments:

Product Var Name i\_aer4\_sval1

Is element of: GLA10 record

Short Description: Aerosol true S Values from table

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: 100\*sr

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100

Product Maximum: 20000

Description: Aerosol true extinction to backscatter ratios calculated from meteorological and geographic data

Comments:

Product Var Name i\_aer4\_sval2

Is element of: GLA10 record

Short Description: Aerosol true S Values from equation calc.

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: 100\*sr

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100

Product Maximum: 20000

Description: Aerosol true extinction to backscatter ratios calculated from optically thin layer considerations

Comments:

Product Var Name i\_cld1\_bot

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution cloud bottom heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_cld1\_top

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Cloud Top at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution cloud top heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_cld1\_grd\_det

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Ground Detection at 532 nm

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution processed ground height at 1hz, 1 per profile

Comments:

Product Var Name i\_aer4\_bot

Is element of: GLA10 record

Short Description: Low Resolution Aerosol Layer Bottom at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 4000

Description: Low resolution aerosol layer bottom heights for layers which were selected for optical processing at 0.25hz, 1 per layer, 9 layers including the planetary boundary layer and PSC

Comments:

Product Var Name i\_aer4\_top

Is element of: GLA10 record

Short Description: Low Resolution Aerosol Layer Top at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 4000

Description: Low resolution aerosol layer top heights for layers which were selected for optical processing at 0.25hz, 1 per layer, 9 layers including the planetary boundary layer and PSC

## Comments:

Product Var Name i\_pbl4\_grd\_det

Is element of: GLA10 record

Short Description: Low Resolution Aerosol Layer Ground Detection

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gj\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description: Low resolution processed ground detection height at 0.25hz, 1 per profile

## Comments:

Product Var Name i\_spare2

Is element of: GLA10 record

Short Description: Spare 2

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA10 spare2.

Product Var Name i\_cld1\_sval\_uf

Is element of: GLA10 record

Short Description: Cloud true S values use flag

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Cloud true S values use flag for 10 layers at 1 Hz for 4 sec. First 40 bits (bytes 16-20) are for 10 layers of the first second, last 40 bits (bytes 1 - 5) are for 10 layers of the fourth second. Stipulates which extinction to backscatter ratio was used in processing (1=default, 2=calculated). 15 denotes no layer detected (invalid).

Please see [flags/i\\_cld1\\_sval\\_uf.pdf](flags/i_cld1_sval_uf.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_aer4\_sval\_uf

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol true S Values use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Aerosol true S values use flag for 9 layers at 1 per 4 sec. Bits 0-3 (least significant bits) of byte 5 are for first layer, bits 0-3 of byte 1 are for 9th layer. 15 denotes no layer detected (invalid). Bits 36-39 are spares needed to make 5 bytes. Stipulates which extinction to backscatter ratio was used in processing (1=default, 2=calculated).

Please see [flags/i\\_aer4\\_sval\\_uf.pdf](flags/i_aer4_sval_uf.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare3

Is element of: GLA10 record

Short Description: Spares

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cld1\_bs\_flag

Is element of: GLA10 record

Short Description: Cloud backscatter flag for 532 nm

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_cld1\_bs\_flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_cld1\_ext\_flag

Is element of: GLA10 record

Short Description: Cloud extinction flag at 532 nm

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_cld1\_ext\_flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_aer4\_bs\_flag

Is element of: GLA10 record

Short Description: Aerosol backscatter flag for 532 nm

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details



Please see [the PDF flag description in the next section](flags/i_aer4_bs_flag.pdf) for more details.

Comments:

Product Var Name `i_aer4_ext_flag`

Is element of: GLA10 record

Short Description: Aerosol extinction flag for 532 nm

Product Data Type: `i1b (10)`

Total Bytes: 10

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see [the PDF flag description in the next section](flags/i_aer4_ext_flag.pdf) for more details.

Comments:

Product Var Name `i_spare4`

Is element of: GLA10 record

Short Description: Spare 4

Product Data Type: `i1b`

Total Bytes: 1

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name `i_AttFlg3`

Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude Flag 3

Product Data Type: `i1b`

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Please see <a href='flags/i\_AttFlg3.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_SolarAngle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Solar Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: micro-degrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_MRg\_cldtop\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Temperature

Comments:

Product Var Name i\_MRg\_cldtop\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Top Pressure

Comments:

Product Var Name i\_MRg\_cldtop\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Comments:

Product Var Name i\_MRg\_cldbot\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Temperature

Comments:

Product Var Name i\_MRg\_cldbot\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Bottom Pressure

Comments:

Product Var Name i\_MRg\_cldbot\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

## Comments:

Product Var Name i\_Aer\_top\_temp

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Temperature at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Aerosol Layers Temperature at Top of Layer at 532 nm

## Comments:

Product Var Name i\_Aer\_top\_pres

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Pressure at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Aerosol Layers Pressure at Top of Layer at 532 nm

## Comments:

Product Var Name i\_Aer\_top\_relh

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_temp

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_pres

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_relh

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Surface Temperature, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Pressure

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Pressure, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Relative Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Surface Relative Humidity, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Speed

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Wind Speed, 4 of 1-second intervals. Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Surface wind direction azimuth from North, 4 of 1-second intervals. Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_aod\_boht\_4s

Is element of: GLA10 record

Short Description: Cloud-free Trop. Height



Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -1000

Product Maximum: 40000

Description: Height of cloud-free troposphere (bottom of full column extinction profile).

Comments:

Product Var Name i\_spare5

Is element of: GLA10 record

Short Description: Spare 5

Product Data Type: i1b (290)

Total Bytes: 290

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare5 GLA10

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_beam\_coelev

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Co-elevation

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot.

Comments:

Product Var Name i\_beam\_azimuth

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Azimuth

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Azimuth (Az) is the direction clockwise from north of the laser beam as seen by an observer at the laser ground spot.

Comments:

Product Var Name i\_pad\_angle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: PAD Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600000000

Description: Attitude angle calculated from PAD and POD.

Comments:

Product Var Name i\_spare0

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Spares 0

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_AttFig1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_lat

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Latitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_lon

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Profile Location, Longitude

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microdegrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: Profile coordinate in the IERS Terrestrial Reference Frame: east longitude and latitude, at the 1 hertz rate.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Orbit flag

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

There are 4 sets of this flag value, 1/sec for each of the 4 sec covered in the record.

Comments:

Product Var Name i\_surfType

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Region Type

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <a href='flags/i\_surfType.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_LidarQF

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Lidar Frame quality flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Composite Flag - see Common Flag Spreadsheet for details

Please see [the PDF flag description in the next section](\"/flags/i_LidarQF.pdf\") for more details.

Comments:

Product Var Name i\_cld1\_od

Is element of: GLA11 Record

Short Description: Cloud Optical Depth at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: 532 nm cloud optical depth, corrected for multiple scattering, at 1hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_aer4\_od

Is element of: GLA11 Record

Short Description: Aerosol Optical Depth at 532 nm

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: 532 nm elevated aerosol optical depth, corrected for multiple scattering, at 0.25hz, 1 per layer, 8 layers

Comments:

Product Var Name i\_pbl4\_od

Is element of: GLA11 Record

Short Description: PBL Optical Depth at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: 532 nm Planetary Boundary Layer aerosol optical depth, corrected for multiple scattering at 0.25hz, 1 per layer, 1 layer

Comments:

Product Var Name i\_aer4\_msf

Is element of: GLA11 Record

Short Description: Aerosol Multiple Scattering Factor

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Aerosol multiple scattering coefficient used at 0.25hz, 1 per layer, 9 layers (including PSC and PBL)

Comments:

Product Var Name i\_cld1\_msf

Is element of: GLA11 Record

Short Description: Cloud Multiple Scattering Factor

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Cloud multiple scattering coefficient at 1 hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_cld1\_bot

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Cloud Bottom at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution cloud bottom heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_cld1\_top

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Cloud Top at 532 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution cloud top heights for layers which were selected for optical processing at 1hz, 1 per layer, 10 layers

Comments:

Product Var Name i\_cld1\_grd\_det

Is element of: GLA10 record, GLA11 Record

Short Description: Medium Resolution Ground Detection at 532 nm

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2000

Description: Medium resolution processed ground height at 1hz, 1 per profile

Comments:



Product Var Name i\_aer4\_bot

Is element of: GLA11 Record

Short Description: Low Resolution Aerosol Layer Bottom at 532 nm

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 4000

Description: Low resolution elevated aerosol layer (including PSC) bottom height for layers which were selected for optical processing at 0.25hz, 1 per layer, 8 layers

Comments:

Product Var Name i\_aer4\_top

Is element of: GLA11 Record

Short Description: Low Resolution Aerosol Layer Top at 532 nm

Product Data Type: i2b (8)

Total Bytes: 16

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 4000

Description: Low resolution elevated aerosol layer (including PSC) top height for layers which were selected for optical processing at 0.25hz, 1 per layer, 8 layers

Comments:

Product Var Name i\_aer4\_ht

Is element of: GLA11 Record

Short Description: Low Resolution PBL Height at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 700

Description: Low resolution Planetary Boundary Layer height at 0.25hz, 1 per profile

Comments:

Product Var Name i\_aer4\_grd\_det

Is element of: GLA11 Record

Short Description: Low Resolution Ground Detection at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 1000

Description: Low resolution processed ground detection height at 0.25hz, 1 per profile

Comments:

Product Var Name i\_erd

Is element of: GLA11 Record

Short Description: Estimated Range Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: millimeters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: The estimated range delay is an estimate of the effect of atmospheric multiple scattering on the measured range as deduced from the surface pulse. Tables were created using the Monte Carlo method which contain the range delay as a function of height of scattering layer, geometrical thickness, optical thickness and particle size. The i\_erd is provided to the elevation process as a range correction and is reported as a negative number that can be added to the range to correct it. The computation of i\_erd is restricted to those times when the 532 channel was working sufficiently well (L2A and first half of L2B (also possibly for night L3A and L3B)).

Comments:

Product Var Name i\_pse

Is element of: GLA11 Record

Short Description: Particle Size Estimate

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: microns

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Particle size estimate used to calculate warning flag and range delay, 1 per second

Comments:

Product Var Name i\_cld1\_mswf

Is element of: GLA11 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Cloud Multiple Scattering Warning Flag at 1 Hz for 4 sec. First 4 bits are for first second, last 4 bits are for 4th second.

Please see [the PDF flag description in the next section](flags/i_cld1_mswf.pdf) for more details.

The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify 'invalid'. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically 'thick' cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range.

Comments:

Product Var Name i\_cld1\_flag

Is element of: GLA11 Record

Short Description: Cloud optical depth flag for 532 nm

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_cld1\_flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_aer4\_flag

Is element of: GLA11 Record

Short Description: Aerosol optical depth flag for 532 nm

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_aer4\_flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_pbl4\_flag

Is element of: GLA11 Record

Short Description: PBL optical depth flag for 532 nm

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Composite Flag - see Breakout for details

Please see <a href='flags/i\_pbl4\_flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFig3

Is element of: GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Attitude Flag 3

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Please see [the PDF flag description in the next section](\"flags/i_AttFlg3.pdf\") for more details.

Comments:

Product Var Name `i_timecorflg`

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: `i2b`

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see [the PDF flag description in the next section](\"flags/i_timecorflg.pdf\") for more details.

Comments:

Product Var Name `i_rdu`

Is element of: GLA11 Record

Short Description: Range Delay Uncertainty

Product Data Type: `i2b (4)`

Total Bytes: 8

Product Units: millimeters

Invalid Value/Flag: `gi_invalid_i2b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Estimated uncertainty value in the range delay distance.

Comments:

Product Var Name `i_spare2`

Is element of: GLA11 Record

Short Description: Spare 2

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA11 spare2.

Product Var Name i\_SolarAngle

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Solar Angle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: micro-degrees

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_MRg\_cldtop\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Temperature

Comments:

Product Var Name i\_MRg\_cldtop\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Top Pressure

Comments:

Product Var Name i\_MRg\_cldtop\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Top Relative Humidity

Comments:

Product Var Name i\_MRg\_cldbot\_temp

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Temperature

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Temperature

Comments:

Product Var Name i\_MRg\_cldbot\_pres

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Pressure

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 532 nm Cloud Bottom Pressure

Comments:

Product Var Name i\_MRg\_cldbot\_relh

Is element of: GLA09 Record, GLA10 record, GLA11 Record

Short Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Medium Resolution 532 nm Cloud Bottom Relative Humidity

Comments:

Product Var Name i\_Aer\_top\_temp

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Temperature at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Aerosol Layers Temperature at Top of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_top\_pres

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Pressure at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Aerosol Layers Pressure at Top of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_top\_relh

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Aerosol Layers Relative Humidity at Top of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_temp

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Aerosol Layers Temperature at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_pres

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Aerosol Layers Pressure at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_bot\_relh

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Aerosol Layers Relative Humidity at Bottom of Layer at 532 nm

Comments:

Product Var Name i\_Aer\_ir\_top

Is element of: GLA08 Record, GLA11 Record

Short Description: Elevation of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Top of Aerosol Layers detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot

Is element of: GLA08 Record, GLA11 Record

Short Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Bottom of Aerosol Layers Detected in 1064 nm.

Comments:

Product Var Name i\_Aer\_ir\_top\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_top\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_top\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_Aer\_ir\_bot\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Aerosol Layers Detected in 1064 nm

Comments:

Product Var Name i\_MRir\_cld\_top

Is element of: GLA09 Record, GLA11 Record

Short Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cld\_bot

Is element of: GLA09 Record, GLA11 Record

Short Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -100

Product Maximum: 2200

Description: Elevation of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldtop\_temp

Is element of: GLA09 Record, GLA11 Record

Short Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldtop\_pres

Is element of: GLA09 Record, GLA11 Record

Short Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Top of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldtop\_relh

Is element of: GLA09 Record, GLA11 Record

Short Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Top of Cloud Layers in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_temp

Is element of: GLA09 Record, GLA11 Record

Short Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_pres

Is element of: GLA09 Record, GLA11 Record

Short Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_cldbot\_relh

Is element of: GLA09 Record, GLA11 Record

Short Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at MR

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Bottom of Cloud Layers Detected in 1064 nm at Medium Resolution data rate.

Comments:

Product Var Name i\_MRir\_QAflag

Is element of: GLA09 Record, GLA11 Record

Short Description: Medium Resolution 1064 nm Cloud Layer QA Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Medium Resolution 1064 nm Cloud Layer QA Flag. Composite Flag - see Breakout for details

Please see <a href='flags/i\_MRir\_QAflag.pdf'> the PDF flag description in the next section for more details.

The data is arranged in 40 bytes.

bytes 1-18 are spares:

bytes 19-20 are af flags: The 4 'af' flags (4 bits each) are concatenated with the QAflag storage and are contained in bytes 19-20 starting at bit 0 of byte 20.

bytes 21-40 are QAflags: The QAflag portion has been stored such that interval 1 is in bytes 40-36, interval 2 in bytes 35-31, interval 3 in bytes 30-26, and interval 4 in bytes 25-21. Each of the 10 layer flags per interval is 4 bits in length as before, such that interval 1 layer 1 is in bits 0-3 and interval 1 layer 2 is in bits 4-7 of byte 40, interval 1 layer 3 is in bits 0-3 and interval 1 layer 4 is in bits 4-7 of byte 39, etc.



Quality flag value 15=cloud layers were not searched for; 0=cloud layers were searched but not detected; 1-14 indicate increasing confidence of good cloud retrieval (value 1=least confidence, value 14=greatest confidence).

Availability flag value 15=cloud layers not searched for; 0=layers searched for but not detected.

Comments:

Product Var Name i\_Aer\_PBL\_LR\_temp

Is element of: GLA08 Record, GLA11 Record

Short Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Temperature of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Aer\_PBL\_LR\_pres

Is element of: GLA08 Record, GLA11 Record

Short Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Pressure of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Aer\_PBL\_LR\_relh

Is element of: GLA08 Record, GLA11 Record

Short Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Relative Humidity of Low Resolution Planetary Boundary Layer Top at 532 nm

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Surface Temperature, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Pressure

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Pressure, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Relative Humidity

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Surface Relative Humidity, 4 of 1-second intervals.

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Speed

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Surface Wind Speed, 4 of 1-second intervals. Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Surface wind direction azimuth from North, 4 of 1-second intervals. Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_Aer\_ir\_OD

Is element of: GLA11 Record

Short Description: Aerosol Optical Depth at 1064 nm

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Aerosol Optical Depth at 1064 nm

Comments:

Product Var Name i\_cld\_ir\_OD

Is element of: GLA11 Record

Short Description: Cloud Optical Depth at 1064 nm

Product Data Type: i2b (10, 4)

Total Bytes: 80

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Cloud Optical Depth at 1064 nm

Comments:

Product Var Name i\_spare6

Is element of: GLA11 Record

Short Description: Spare 6

Product Data Type: i1b (202)

Total Bytes: 202

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA11 Spare6

Product Var Name i\_reflect\_1064od\_40hz\_cor

Is element of: GLA11 Record

Short Description: 40 Hz 1064nm total column od

Product Data Type: i2b (40, 4)

Total Bytes: 320

Product Units: unitless

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -100

Product Maximum: 10000

Description: Total column 1064nm optical depth from surface reflectance corrected for multiple scattering.

Comments:

Product Var Name i\_reflect\_1064msf\_40hz

Is element of: GLA11 Record

Short Description: 40 Hz 1064nm multiple scattering corr. factor

Product Data Type: i1b (40, 4)

Total Bytes: 160

Product Units: unitless

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: Total column od 1064nm multiple scattering correction factor.

Comments:

Product Var Name i\_reflect\_1064od\_1hz\_cor

Is element of: GLA11 Record

Short Description: 1 Hz 1064nm total column od

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: unitless

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -100

Product Maximum: 10000

Description: Total column 1064nm optical depth from surface reflectance corrected for multiple scattering.

Comments:

Product Var Name i\_reflect\_1064msf\_1hz

Is element of: GLA11 Record

Short Description: 1 Hz 1064nm multiple scattering corr. factor

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: unitless

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 255

Description: Total column od 1064nm multiple scattering correction factor.

Comments:

Product Var Name i\_reflect\_pristine\_1hz

Is element of: GLA11 Record

Short Description: 1064nm modeled surface reflectance

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: unitless

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 5000

Description: Modeled (calculated) 1064nm surface reflectance from wind speed.

Comments:

Product Var Name i\_aod\_4s

Is element of: GLA11 Record

Short Description: Total Column Aerosol OD (AOD)

Product Data Type: i2b

Total Bytes: 2

Product Units: unitless\*1000

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -100

Product Maximum: 10000

Description: Total column aerosol optical depth (AOD).

Comments:

Product Var Name i\_aod\_flg\_4s

Is element of: GLA11 Record

Short Description: AOD use flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 15

Description: AOD use flag.<br>

<br>

The total column AOD use flag ranges from 0 - 7 and has the following meanings:<br>

<br>

0 - night, full column good, no bad layers, ground detected - highest quality<br>

1 - day, no full column, sum of all detected layers, no bad layers, ground detected - highest daytime quality<br>

2 - night, full column good, with detected lower layers with a bad layer<br>

3 - night, full column good, with bad lower layers<br>

4 - night, full column bad, includes only detected lower layers.<br>

5 - day, no full column, sum of all good layers, but bad layer present<br>

6 - night, full column good, but no ground detected<br>

7 - day, no full column, good or no layers, but no ground detected<br>

15 - invalid<br>

<br>

Notes: In the descriptions above 'full column' means the extinction retrieval from 20 km to d\_aod\_botht\_4s. 'Bad layer' means a layer for which extinction could not be computed.<br>

Comments:

Product Var Name i\_spare3

Is element of: GLA11 Record

Short Description: Spare 3

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_bs\_erd

Is element of: GLA11 Record

Short Description: Blowing Snow Range Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: millimeters \* 10

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Estimated range delay due to blowing snow.

Comments:

Product Var Name i\_bs\_conf

Is element of: GLA11 Record

Short Description: Blowing Snow Confidence

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 15

Description: A number that indicates the degree of confidence that this is indeed blowing snow. Blowing snow confidence ranges from 0 - 15 and has the following meanings:<br>

<br>

15: profile never tested for blowing snow (outside of latitude limits, or over ocean).<br>

14: wind speed too low or clouds above 1.5 km<br>

7-13: BS detected, 532 used, low to high confidence in blowing snow<br>

1-6: BS detected, 1064 used, low to high confidence in blowing snow<br>

0: profile tested, but no blowing snow detected<br>



## Comments:

Product Var Name i\_aer4\_sval1

Is element of: GLA11 Record

Short Description: Aerosol true S Values from table

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: 100\*sr

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 100

Product Maximum: 20000

Description: Aerosol true extinction to backscatter ratios calculated from meteorological and geographic data

## Comments:

Product Var Name i\_aer4\_sval\_ratio

Is element of: GLA11 Record

Short Description: 532/1064 aerosol S ratio

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: N/A

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 210

Description: The ratio of 532 nm extinction to backscatter ratio (S532) to the 1064 nm extinction to backscatter ratio (S1064) for each detected aerosol layer.

## Comments:

Product Var Name i\_aer4\_aod\_ratio

Is element of: GLA11 Record

Short Description: 532/1064 aerosol optical depth ratio

Product Data Type: i2b (9)

Total Bytes: 18

Product Units: N/A

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 120

Product Maximum: 380

Description: The ratio of 532 nm aerosol optical depth to 1064 nm aerosol optical depth for each detected aerosol layer.

Comments:

Product Var Name i\_aer4\_sval\_uf

Is element of: GLA10 record, GLA11 Record

Short Description: Aerosol true S Values use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Aerosol true S values use flag for 9 layers at 1 per 4 sec. Bits 0-3 (least significant bits) of byte 5 are for first layer, bits 0-3 of byte 1 are for 9th layer. 15 denotes no layer detected (invalid). Bits 36-39 are spares needed to make 5 bytes. Stipulates which extinction to backscatter ratio was used in processing (1=default, 2=calculated).

Please see <a href="flags/i\_aer4\_sval\_uf.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare5

Is element of: GLA11 Record

Short Description: Spare 5

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA11 Spare 5

Product Var Name i\_reflCor\_atm

Is element of: GLA11 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Unitless

Invalid Value/Flag: N/A

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 1000000

Description: This reflectance correction factor is calculated as  $1 / e^{-(2(tc+ta+tp+tm))}$ , where  $tc$  is the cloud (column) integrated optical depth,  $ta$  is the aerosol (column) integrated optical depth,  $tp$  is the planetary boundary layer optical depth, and  $tm$  is the molecular optical depth.  $tm$  is a constant equal to  $-\log(gd\_T\_RTatm)/2$ , where  $gd\_T\_RTatm = 0.98$  is defined in `const_elev_mod.f90` or read from ANC07-03. The reflectance has been corrected for waveform saturation. The reflectance correction factor is computed from the 532 nm channel and has been corrected for multiple scattering.

Comments:

Product Var Name `i_spare4`

Is element of: GLA11 Record

Short Description: Spare 4

Product Data Type: `i1b` (160)

Total Bytes: 160

Product Units: NA

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name `i_rec_ndx`

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: `i4b`

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_Spare1

Is element of: GLA12 Record

Short Description: Spare 1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA12 spare1.

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.

Comments:

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_lat

Is element of: GLA12 Record

Short Description: Coordinate Data, Latitude, specific to ice sheet range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ice sheet-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in degrees North.

Comments:

Product Var Name i\_lon

Is element of: GLA12 Record

Short Description: Coordinate Data, Longitude, specific to ice sheet range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ice sheet-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.

Comments:

Product Var Name i\_elev

Is element of: GLA12 Record

Short Description: Ice Sheet Surface elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the ice sheet specific algorithm after instrument corrections, atmospheric delays and tides have been applied.

Comments:

Product Var Name i\_campaign

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Campaign

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: INT(ICHAR(1A))

Product Maximum: INT(ICHAR(3K))

Description: The campaign. ie: for campaign L1A, it will be '1A'.

Comments:

Product Var Name i\_spare40

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 40

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 40.

Product Var Name i\_cycTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cycle and Track

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 10001

Product Maximum: 9991354

Description: The track and cycle. On the product, they will be stored as one number: ccctttt.

Comments:

Product Var Name i\_localSolarTime

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local apparent solar time

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 86400000

Description: Local apparent solar time.

Comments:

Product Var Name i\_spare41

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 41

Product Data Type: i4b (7)

Total Bytes: 28

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information

.Comments: Spare 41.

Product Var Name i\_deltaEllip

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta Ellipsoid

Product Data Type: i2b (40)



Total Bytes: 80

Product Units: mm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -9000

Product Maximum: 9000

Description: Surface Elevation (T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).

Comments:

Product Var Name i\_beamCoelv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Co-elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot. 40Hz.

Comments:

Product Var Name i\_beamAzimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Azimuth

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.

Comments:

Product Var Name i\_d2refTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Distance to the reference ground track

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: m\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000000

Description: Distance to the reference ground track.

Comments:

Product Var Name i\_SigBegOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal Begin Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.

Comments:

Product Var Name i\_DEM\_hires\_src

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: High Resolution Source Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Flag to specify who the source provider was for the high resolution DEM. <br>

0 = no high res source available<br>

1 = unfinished research Shuttle Radar Topography Mission (SRTM)<br>

&nbsp; &nbsp; &nbsp; &nbsp; C-band 90 m DEM produced by JPL (+-1.1km E-W swath)<br>

2 = finished SRTM C-band 90 m DEM produced by NGA (+-2.1km E-W swath)<br>

3 = ICESat Greenland V1 1km DEM<br>

4 = ICESat Antarctica V1 500m DEM<br>

5 = 90m Canadian Digital Elevation Data (CDED)<br>

6 = 90m Canadian Digital Elevation Data (CDED) if available otherwise finished SRTM C-band 90 m DEM<br>

Comments: DEM elevations are referenced to the TOPEX/Poseidon ellipsoid and are directly comparable to the elevation on the GLAS products.

Product Var Name i\_DEMhiresArElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEMhiresArElv

Product Data Type: i2b (9, 40)

Total Bytes: 720

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500

Product Maximum: 1300

Description: d\_DEMhiresArElv is a 3 X 3 X 40 array of high resolution DEM values. The 1-40 index corresponds to 1/40 second samples. The 1-9 index corresponds to the position of the DEM value relative to the spot. Given the first 1/40 second of data, positional correspondence of the DEM element to the spot is as follows:<br>

<br>

The 9 points on the product correspond to the 3x3 points in the alg variable as follows:<br>

<br>

gla06%d\_DEMhiresArElv(1,1,k) = gla06\_prod%i\_DEMhiresArElv(1,k) NW<br>

gla06%d\_DEMhiresArElv(2,1,k) = gla06\_prod%i\_DEMhiresArElv(2,k) N<br>

gla06%d\_DEMhiresArElv(3,1,k) = gla06\_prod%i\_DEMhiresArElv(3,k) NE<br>

gla06%d\_DEMhiresArElv(1,2,k) = gla06\_prod%i\_DEMhiresArElv(4,k) W<br>

gla06%d\_DEMhiresArElv(2,2,k) = gla06\_prod%i\_DEMhiresArElv(5,k) center<br>

gla06%d\_DEMhiresArElv(3,2,k) = gla06\_prod%i\_DEMhiresArElv(6,k) E<br>

gla06%d\_DEMhiresArElv(1,3,k) = gla06\_prod%i\_DEMhiresArElv(7,k) SW<br>

gla06%d\_DEMhiresArElv(2,3,k) = gla06\_prod%i\_DEMhiresArElv(8,k) S<br>

gla06%d\_DEMhiresArElv(3,3,k) = gla06\_prod%i\_DEMhiresArElv(9,k) SE<br>

<br>

Comments:

Product Var Name i\_ElevBiasCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Bias Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments: See the altimeter user guide for full description.

Product Var Name i\_spare42

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 42

Product Data Type: i2b (4, 40)

Total Bytes: 320

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 42

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_Azimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: millideg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.

Comments:

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_tpintensity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse intensity - frame avg

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpazimuth\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse azimuth - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse eccentricity - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: Unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse major axis - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.

Comments:

Product Var Name i\_poTide

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Pole Tide

Product Data Type: i2b

Total Bytes: 2

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Pole tide: an ocean tide which is the result of the Chandler wobble (a free nutation of the Earth caused by fluctuating pressure on the bottom of the ocean, caused by temperature and salinity changes and wind-driven changes in the circulation of the oceans).

Comments:

Product Var Name i\_gdHt

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Geoid

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -20000

Product Maximum: 20000

Description: The height of the geoid above the ellipsoid for the first and last shot in the record.

## Comments:

Product Var Name i\_erElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solid Earth Tide Elevation (at first &amp; last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The solid earth tide elevation for the first &amp; last shot in the record.

## Comments:

Product Var Name i\_spElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Tide Elevations, Specific

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.

## Comments:

Product Var Name i\_IdElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Load Tide Elevation

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000



Product Maximum: 10000

Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.

Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name i\_spare12

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spares 12

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_wTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction\_Wet Troposphere

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 0

Description: The range correction due to the wet troposphere at first & last shot.

Comments:

Product Var Name i\_dTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Range Correction, Dry Troposphere

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 0

Description: The range correction due to the dry troposphere; one correction for each shot. Validity is based on results of finding a range with the standard fit.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see <a href='flags/i\_surfType.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare11

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 11

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_DEM\_elv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEM Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -50000

Product Maximum: 1000000

Description: Elevation at the footprint location from the SRTM30 (GTOPO30 + SRTM) Digital Elevation Model (DEM). The reference frame for the DEM elevation was changed to the TOPEX/Poseidon ellipsoid to make it consistent with the GLAS elevations.

Comments:

Product Var Name i\_refRng

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Range in distance calculated from the time between the centroid of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.

Comments:

Product Var Name i\_TrshRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Threshold Retracker Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the threshold retracker location on the received echo using standard parameters.

Comments:

Product Var Name i\_isRngOff

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Ice Sheet Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for ice sheets.

Comments: Can be used for comparing elevations computed from results standard and alternate fitting.

Product Var Name i\_SigEndOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal End Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.

Comments:

Product Var Name i\_cntRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Centroid Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.

Comments:

Product Var Name i\_reflctUC

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: reflctUC

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. i\_reflctUC has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity =  $i\_reflctUC * (i\_RecNrgAll + i\_satNrgCorr) / i\_RecNrgAll$ )<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.<br>

<br>

i\_reflctUC is invalid where GLA06%d\_satNrgCorr is invalid.<br>

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflCor\_atm

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i4b

Total Bytes: 4

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 250

Description: This reflectance correction factor is calculated as  $1 / e^{(-2(tc+ta+tp+tm))}$ , where  $t_c$  is the cloud (column) integrated optical depth,  $t_a$  is the aerosol (column) integrated optical depth,  $t_p$  is the planetary boundary layer optical depth, and  $t_m$  is the molecular optical depth.  $t_m$  is a constant equal to  $-\log(gd\_T\_RTatm)/2$ , where  $gd\_T\_RTatm = 0.98$  is defined in `const_elev_mod.f90` or read from ANC07-03. The attenuation correction factor has been corrected for multiple scattering. The reflectance has been corrected for waveform saturation.

Comments:

Product Var Name `i_maxSmAmp`

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: `i2b (40)`

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name `i_ocElv`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Ocean Tide Elevation

Product Data Type: `i2b (40)`

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: `gi_invalid_i2b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The ocean tide elevation from the TPX07.1 tide model.

Comments:

Product Var Name `i_numPk`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Number of Peaks found in the Return

Product Data Type: `i1b (40)`

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: The number of peaks in the return echo found by the Gaussian fitting procedure, using standard parameters.

Comments:

Product Var Name i\_kurt2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Kurtosis of the Received Echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using standard parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_skew2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Skewness

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The skewness of the received echo from signal begin to signal end using standard parameters.

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_spare4

Is element of: GLA06 record, GLA12 Record, GLA14 Record, GLA15 Record

Short Description: Spare 4

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_IsRngLast

Is element of: GLA12 Record

Short Description: Ice Sheet Range offset using last peak

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate ice sheet specific range from centroid of last peak in standard Gaussian fit.

Comments:

Product Var Name i\_IsRngFst

Is element of: GLA12 Record

Short Description: Ice Sheet Range Offset using first peak

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate ice sheet specific range from centroid of first peak in standard Gaussian fit

Comments:



Product Var Name i\_IceSVar

Is element of: GLA12 Record

Short Description: Standard Deviation of the ice sheet Gaussian Fit

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: microvolts\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter d\_wfFitSDev\_2 (standard).

Comments:

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the [PDF file](flags/i_ElvuseFlg.pdf) for more information.

Comments:

Product Var Name i\_atm\_avail

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_spare16`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 16

Product Data Type: `i1b (4)`

Total Bytes: 4

Product Units: `n/a`

Invalid Value/Flag: `n/a`

Is Correction Flag?: `NA`

Is Unsigned?: `No`

Product Minimum: `n/a`

Product Maximum: `n/a`

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name `i_cld1_mswf`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: `i1b`

Total Bytes: 1

Product Units: `NA`

Invalid Value/Flag: `No`

Is Correction Flag?: `NA`

Is Unsigned?: `No`

Product Minimum: `0`

Product Maximum: `15`

Description: The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify `invalid`. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically `thick` cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range. Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_MRC_af`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Medium Resolution Cloud Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Tells how many cloud layers were found at this resolution from the 532 nm channel. Please see [the PDF flag description in the next section](flags/i_MRC_af.pdf) for more details. This parameter is extracted from the i\_MRCL\_flag on GLA09.

Comments:

Product Var Name i\_spare9

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Spare 9

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see <a href='flags/i\_ElvFlg.pdf'> the PDF flag description in the next section for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_rng\_UQF

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Offset Quality/Use Flag

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Data quality flag for the range offsets on this record.

Please see <a href='flags/i\_rng\_UQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see <[a href='flags/i\\_AttFlg2.pdf'](flags/i_AttFlg2.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare5

Is element of: GLA12 Record

Short Description: Spares

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <[a href='flags/i\\_FrameQF.pdf'](flags/i_FrameQF.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_rngCorrFlg`

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: `i1b (2)`

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_CorrStatFlg`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Correction Status Flag

Product Data Type: `i1b (2)`

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name i\_spare15

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 15

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Spare6

Is element of: GLA12 Record

Short Description: Spare 6

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null



Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA12 spare6.

Product Var Name i\_spare44

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 44

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_satElevCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Elevation Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments:

Product Var Name i\_satCorrFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Correction Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: NA

Product Maximum: NA

Description: Please see <a href="flags/i\_satCorrFlg.pdf"> the PDF flag description in the next section for more details.<br>

<br>

Bits 0-3: i\_satElevCorr flag (4 bits); values indicated below: <br>

<br>

0= Not Saturated (i\_satNdx < 2) or No Signal<br>

1= Sat. Correction is Inconsequential (i\_satNdx >= 2 & i\_pctSat < 2.0)<br>

2= Sat. Correction is Applicable (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* < 100ns)<br>

3= Sat. Correction is Not Computable effects elevations can not be corrected<br>

4= Sat. Correction model is Not Applicable so data can not be corrected (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* >= 100ns) there are errors in the data but the effects on elevations can not be corrected <br>

<br>

values 5-15=TBD

Bits 4-5: i\_satNrgCorr flag (2 bits):<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

<br>

Bits 6-7: TBD:<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

Comments:

Product Var Name i\_satNrgCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Energy Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: .01fJ

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.

Comments:

Product Var Name i\_spare13

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 13

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: null

Invalid Value/Flag: null

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

Product Var Name i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APIID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

Product Var Name i\_FRir\_cldtop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 1 second record. This parameter is in GLA09.

Comments:

Product Var Name i\_FRir\_qaFlag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: One byte per data quality flag.

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height. Please see [flags/i\\_FRir\\_qaFlag.pdf](flags/i_FRir_qaFlag.pdf) the PDF flag description in the next section for more details. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere

0 clear

1 high cloud (> 5 km) low optical depth

2 high cloud (> 5 km), high optical depth

3 mid cloud (>2, <=5 km) low optical depth

4 mid cloud (>2, <=5 km) high optical depth

5 low cloud (> 500 m, <=2 km), low optical depth

6 low cloud (> 500 m, <=2 km), high optical depth  
7 blowing snow or fog (< 500 m), low optical depth  
8 blowing snow or fog (< 500 m), high optical depth  
9 not tested  
10 data quality insufficient to assign flag

Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag

Comments: 0 Not applicable (for contamination flag values of 9 or 10)

1 low confidence  
2 reasonable confidence  
3 high confidence

Product Var Name i\_spare48

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 48

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FRir\_intsig

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (40)

Total Bytes: 80

Product Units:  $\text{e}7/(\text{m-sr})$

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of  $1.0\text{e-}7$  ( $1/(\text{m-sr})$  units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_spare14

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 14

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Atmospheric temperature at Earth's surface level measured in degrees Celsius and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Atmospheric pressure at Earth's surface level measured in hPa and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.

Comments:

Product Var Name i\_maxRecAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.

Product Var Name i\_sDevNsOb1

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

Product Var Name i\_pctSAT

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Percent Saturation

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: percent

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: -127

Product Maximum: 127

Description: Percent saturation (d\_pctSAT) is calculated using the formula:  $d\_pctSAT = 100 * (\text{saturation index}) / (\text{signal end} - \text{signal begin in nanoseconds})$ . The alternate signal end/begin are used for GLA14%d\_pctSAT, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid satElevCorr values and satCorrFlg values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.

Comments:

**Product Var Name i\_TxNrg**

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

**Product Var Name i\_eqElv**

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Equilibrium Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -10000

Product Maximum: 10000

Description: The equilibrium (long period) tide at first and last valid shot over the ocean.

Comments:

**Product Var Name i\_Spare7**

Is element of: GLA06 record, GLA12 Record, GLA13 Record

Short Description: Spare 7

Product Data Type: i1b (282)

Total Bytes: 282

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA06, GLA12, GLA13 spare7.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_Spare1

Is element of: GLA13 Record

Short Description: Spare 1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA13 spare1.

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.

Comments:

## Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

## Product Var Name i\_lat

Is element of: GLA13 Record

Short Description: Coordinate Data, Latitude, specific to sea ice range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, PAD, and sea ice specific range after all atmospheric corrections and tides have been applied.

Comments:

## Product Var Name i\_lon

Is element of: GLA13 Record

Short Description: Coordinate Data, Longitude, specific to sea ice range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the 40 laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, PAD, and sea ice specific range after all atmospheric corrections and tides have been applied. The values are in east longitude.

Comments:

Product Var Name i\_elev

Is element of: GLA13 Record

Short Description: Sea Ice Surface Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Surface elevation wrt ellipsoid at the spot location determined by range using the sea ice specific fitting procedure after atmospheric delays and tides have been applied.

Comments:

Product Var Name i\_campaign

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Campaign

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: INT(ICHAR(1A))

Product Maximum: INT(ICHAR(3K))

Description: The campaign. ie: for campaign L1A, it will be '1A'.

Comments:

Product Var Name i\_spare40

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 40

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 40.

Product Var Name i\_cycTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cycle and Track

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 10001

Product Maximum: 9991354

Description: The track and cycle. On the product, they will be stored as one number: cccttt.

Comments:

Product Var Name i\_localSolarTime

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local apparent solar time

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 86400000

Description: Local apparent solar time.

Comments:

Product Var Name i\_spare41

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 41

Product Data Type: i4b (7)

Total Bytes: 28

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 41.

Product Var Name i\_deltaEllip

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta Ellipsoid

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -9000

Product Maximum: 9000

Description: Surface Elevation (T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).

Comments:

Product Var Name i\_beamCoelv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Co-elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot. 40Hz.

Comments:



Product Var Name i\_beamAzimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Azimuth

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.

Comments:

Product Var Name i\_d2refTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Distance to the reference ground track

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: m\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000000

Description: Distance to the reference ground track.

Comments:

Product Var Name i\_SigBegOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal Begin Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.

Comments:

Product Var Name i\_DEM\_hires\_src

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: High Resolution Source Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Flag to specify who the source provider was for the high resolution DEM. <br>

0 = no high res source available<br>

1 = unfinished research Shuttle Radar Topography Mission (SRTM)<br>

&nbsp; &nbsp; &nbsp; &nbsp; C-band 90 m DEM produced by JPL (+-1.1km E-W swath)<br>

2 = finished SRTM C-band 90 m DEM produced by NGA (+-2.1km E-W swath)<br>

3 = ICESat Greenland V1 1km DEM<br>

4 = ICESat Antarctica V1 500m DEM<br>

5 = 90m Canadian Digital Elevation Data (CDED)<br>

6 = 90m Canadian Digital Elevation Data (CDED) if available otherwise finished SRTM C-band 90 m DEM<br>

Comments: DEM elevations are referenced to the TOPEX/Poseidon ellipsoid and are directly comparable to the elevation on the GLAS products.

Product Var Name i\_DEMhiresArElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEMhiresArElv

Product Data Type: i2b (9, 40)

Total Bytes: 720

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500

Product Maximum: 1300

Description: d\_DEMhiresArElv is a 3 X 3 X 40 array of high resolution DEM values. The 1-40 index corresponds to 1/40 second samples. The 1-9 index corresponds to the position of the DEM value relative to the spot. Given the first 1/40 second of data, positional correspondence of the DEM element to the spot is as follows:<br>

<br>

The 9 points on the product correspond to the 3x3 points in the alg variable as follows:<br>

<br>

gla06%d\_DEMHiresArElv(1,1,k) = gla06\_prod%i\_DEMHiresArElv(1,k) NW<br>

gla06%d\_DEMHiresArElv(2,1,k) = gla06\_prod%i\_DEMHiresArElv(2,k) N<br>

gla06%d\_DEMHiresArElv(3,1,k) = gla06\_prod%i\_DEMHiresArElv(3,k) NE<br>

gla06%d\_DEMHiresArElv(1,2,k) = gla06\_prod%i\_DEMHiresArElv(4,k) W<br>

gla06%d\_DEMHiresArElv(2,2,k) = gla06\_prod%i\_DEMHiresArElv(5,k) center<br>

gla06%d\_DEMHiresArElv(3,2,k) = gla06\_prod%i\_DEMHiresArElv(6,k) E<br>

gla06%d\_DEMHiresArElv(1,3,k) = gla06\_prod%i\_DEMHiresArElv(7,k) SW<br>

gla06%d\_DEMHiresArElv(2,3,k) = gla06\_prod%i\_DEMHiresArElv(8,k) S<br>

gla06%d\_DEMHiresArElv(3,3,k) = gla06\_prod%i\_DEMHiresArElv(9,k) SE<br>

<br>

Comments:

Product Var Name i\_ElevBiasCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Bias Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments: See the altimeter user guide for full description.

Product Var Name i\_spare42

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 42

Product Data Type: i2b (4, 40)

Total Bytes: 320

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 42

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_Azimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: millideg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.

Comments:

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_tpintensity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse intensity - frame avg

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpazimuth\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse azimuth - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse eccentricity - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: Unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse major axis - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.

Comments:

Product Var Name i\_poTide

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Pole Tide

Product Data Type: i2b

Total Bytes: 2

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Pole tide: an ocean tide which is the result of the Chandler wobble (a free nutation of the Earth caused by fluctuating pressure on the bottom of the ocean, caused by temperature

and salinity changes and wind-driven changes in the circulation  
of the oceans).

Comments:

Product Var Name i\_gdHt

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Geoid

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -20000

Product Maximum: 20000

Description: The height of the geoid above the ellipsoid for the first and last shot in the record.

Comments:

Product Var Name i\_erElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solid Earth Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The solid earth tide elevation for the first & last shot in the record.

Comments:

Product Var Name i\_spElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Tide Elevations, Specific

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.

Comments:

Product Var Name i\_IdElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Load Tide Elevation

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.

Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name i\_spare12

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spares 12

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_wTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction\_Wet Troposphere

Product Data Type: i2b (2)



Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 0

Description: The range correction due to the wet troposphere at first & last shot.

Comments:

Product Var Name i\_dTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Range Correction, Dry Troposphere

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 0

Description: The range correction due to the dry troposphere; one correction for each shot. Validity is based on results of finding a range with the standard fit.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see [flags/i\\_surfType.pdf](#) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare11

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 11

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_DEM\_elv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEM Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -50000

Product Maximum: 1000000

Description: Elevation at the footprint location from the SRTM30 (GTOPO30 + SRTM) Digital Elevation Model (DEM). The reference frame for the DEM elevation was changed to the TOPEX/Poseidon ellipsoid to make it consistent with the GLAS elevations.

Comments:

Product Var Name i\_refRng

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Range in distance calculated from the time between the centroid of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.

Comments:

Product Var Name i\_TrshRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Threshold Retracker Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the threshold retracker location on the received echo using standard parameters.

Comments:

Product Var Name i\_siRngOff

Is element of: GLA06 record, GLA13 Record

Short Description: Sea Ice Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for sea ice.

Comments:

Product Var Name i\_SigEndOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal End Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to *i\_refRng* to give the range in distance to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.

Comments:

Product Var Name *i\_cntRngOff*

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Centroid Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: *gi\_invalid\_i4b*

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to *i\_refRng* to give the range in distance to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.

Comments:

Product Var Name *i\_reflctUC*

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: *reflctUC*

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: *gi\_invalid\_i4b*

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. *i\_reflctUC* has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity = *i\_reflctUC* \* (*i\_RecNrgAll* + *i\_satNrgCorr*)/*i\_RecNrgAll*)<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by *d\_reflCor\_atm*.<br>

<br>

i\_reflectUC is invalid where GLA06%d\_satNrgCorr is invalid.<br>

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflCor\_atm

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i4b

Total Bytes: 4

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 250

Description: This reflectance correction factor is calculated as  $1 / e^{(-2(tc+ta+tp+tm))}$ , where tc is the cloud (column) integrated optical depth, ta is the aerosol (column) integrated optical depth, tp is the planetary boundary layer optical depth, and tm is the molecular optical depth. tm is a constant equal to  $-\log(gd\_T\_RTatm)/2$ , where  $gd\_T\_RTatm = 0.98$  is defined in const\_elev\_mod.f90 or read from ANC07-03. The attenuation correction factor has been corrected for multiple scattering. The reflectance has been corrected for waveform saturation.

Comments:

Product Var Name i\_maxSmAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_ocElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Ocean Tide Elevation

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The ocean tide elevation from the TPX07.1 tide model.

Comments:

Product Var Name i\_numPk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Number of Peaks found in the Return

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: The number of peaks in the return echo found by the Gaussian fitting procedure, using standard parameters.

Comments:

Product Var Name i\_kurt2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Kurtosis of the Received Echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using standard parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_skew2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Skewness

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The skewness of the received echo from signal begin to signal end using standard parameters.

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_spare4

Is element of: GLA13 Record

Short Description: Spare 4

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_BergElev

Is element of: GLA13 Record

Short Description: Iceberg Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200000

Description: For waveforms with more than 1 peak, 'iceberg' elevation is calculated using the difference between the range offset of the maximum amplitude peak and the range offset of the first peak. Computations are made after atmospheric and tide corrections have been applied. The elevation computed is relative to the ellipsoid.

Comments: Users should be wary that this parameter is computed for all multiple-peak GLA13 records, even if the elevation is too high to be sea-ice.

Product Var Name i\_spare10

Is element of: GLA13 Record

Short Description: Spare 10

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA13 spare10.

Product Var Name i\_SiRngFst

Is element of: GLA13 Record

Short Description: Sea ice range increment to first peak

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range increment to be added to reference range to compute the sea ice specific range. This was determined from centroid of first peak in sea ice Gaussian fit

Comments:

Product Var Name i\_SealceVar

Is element of: GLA13 Record

Short Description: Standard Deviation of the sea ice Gaussian fit

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0



Product Maximum: 25500

Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter d\_wfFitSDev\_2 (standard).

Comments:

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the <a href='flags/i\_ElvuseFlg.pdf'>PDF file</A> for more information.

Comments:

Product Var Name i\_atm\_avail

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see <a href='flags/i\_atm\_avail.pdf'>the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare16

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 16

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cld1\_mswf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify ?invalid?. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically ?thick? cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range. Please see [flags/i\\_cld1\\_mswf\\_elv.pdf](\"#\") the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_MRC\_af

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Medium Resolution Cloud Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Tells how many cloud layers were found at this resolution from the 532 nm channel. Please see <a href='flags/i\_MRC\_af.pdf'> the PDF flag description in the next section for more details. This parameter is extracted from the i\_MRCL\_flag on GLA09.

Comments:

Product Var Name i\_spare9

Is element of: GLA13 Record

Short Description: spares

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see <a href='flags/i\_ElvFlg.pdf'> the PDF flag description in the next section for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_rng\_UQF

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Offset Quality/Use Flag

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Data quality flag for the range offsets on this record.

Please see <a href='flags/i\_rng\_UQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

## Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

## Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see [flags/i\\_AttFlg2.pdf](flags/i_AttFlg2.pdf) the PDF flag description in the next section for more details.

Comments:

## Product Var Name i\_spare5

Is element of: GLA13 Record

Short Description: Spare 5

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <a href='flags/i\_FrameQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_rngCorrFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see <[a href='flags/i\\_rngCorrFlg.pdf'](flags/i_rngCorrFlg.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_CorrStatFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Correction Status Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

Please see <[a href='flags/i\\_CorrStatFlg.pdf'](flags/i_CorrStatFlg.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare15

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 15

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information. Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Spare6

Is element of: GLA13 Record

Short Description: Spare 6

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA13 spare6.

Product Var Name i\_spare44

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 44

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: n/a



Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_satElevCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Elevation Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments:

Product Var Name i\_satCorrFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Correction Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: NA

Product Maximum: NA

Description: Please see [the PDF flag description in the next section](flags/i_satCorrFlg.pdf) for more details.<br>

<br>

Bits 0-3: i\_satElevCorr flag (4 bits); values indicated below: <br>

<br>

0= Not Saturated (i\_satNdx < 2) or No Signal<br>

1= Sat. Correction is Inconsequential (i\_satNdx >= 2 & i\_pctSat < 2.0)<br>

2= Sat. Correction is Applicable (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* < 100ns)<br>

3= Sat. Correction is Not Computable effects elevations can not be corrected<br>

4= Sat. Correction model is Not Applicable so data can not be corrected (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* >= 100ns) there are errors in the data but the effects on elevations can not be corrected <br>

<br>

values 5-15=TBD

Bits 4-5: i\_satNrgCorr flag (2 bits):<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

<br>

Bits 6-7: TBD:<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

Comments:

Product Var Name i\_satNrgCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Energy Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: .01fJ

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.

Comments:

Product Var Name i\_spare13

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 13

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: null

Invalid Value/Flag: null

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

Product Var Name i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

Product Var Name i\_FRir\_cldtop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 1 second record. This parameter is in GLA09.

Comments:

Product Var Name i\_FRir\_qaFlag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: One byte per data quality flag.

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height. Please see [i\\_FRir\\_qaFlag.pdf](flags/i_FRir_qaFlag.pdf) the PDF flag description in the next section for more details. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere

0 clear

1 high cloud (> 5 km) low optical depth

2 high cloud (> 5 km), high optical depth

3 mid cloud (>2, <=5 km) low optical depth

4 mid cloud (>2, <=5 km) high optical depth

5 low cloud (> 500 m, <=2 km), low optical depth

6 low cloud (> 500 m, <=2 km), high optical depth

7 blowing snow or fog (< 500 m), low optical depth

8 blowing snow or fog (< 500 m), high optical depth

9 not tested

10 data quality insufficient to assign flag

Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag

Comments: 0 Not applicable (for contamination flag values of 9 or 10)

1 low confidence

2 reasonable confidence

3 high confidence

Product Var Name i\_spare48

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 48

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FRir\_intsig

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: e7/(m-sr)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of  $1.0e-7$  (1/(m-sr) units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_spare14

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 14

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Atmospheric temperature at Earth's surface level measured in degrees Celsius and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Atmospheric pressure at Earth's surface level measured in hPa and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.

Comments:

Product Var Name i\_maxRecAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.

Product Var Name i\_sDevNsOb1

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)



Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

Product Var Name i\_pctSAT

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Percent Saturation

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: percent

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: -127

Product Maximum: 127

Description: Percent saturation (d\_pctSAT) is calculated using the formula:  $d\_pctSAT = 100 * (\text{saturation index}) / (\text{signal end} - \text{signal begin in nanoseconds})$ . The alternate signal end/begin are used for GLA14% d\_pctSAT, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid satElevCorr values and satCorrFig values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.

Comments:

Product Var Name i\_TxNrg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name i\_eqElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Equilibrium Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -10000

Product Maximum: 10000

Description: The equilibrium (long period) tide at first and last valid shot over the ocean.

Comments:

Product Var Name i\_Spare7

Is element of: GLA06 record, GLA12 Record, GLA13 Record

Short Description: Spare 7

Product Data Type: i1b (282)

Total Bytes: 282

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA06, GLA12, GLA13 spare7.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_Spare1

Is element of: GLA14 Record

Short Description: Spare 1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA14 spare1.

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.

Comments:

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_lat

Is element of: GLA14 Record

Short Description: Coordinate Data, Latitude, specific to land range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and land-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in degrees North.

Comments:

Product Var Name i\_lon

Is element of: GLA14 Record

Short Description: Coordinate Data, Longitude, specific to land range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and land-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.

Comments:

Product Var Name i\_elev

Is element of: GLA14 Record

Short Description: Land surface Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the land-specific fitting procedure after all instrument corrections, atmospheric delays and tides have been applied.

Comments:

Product Var Name i\_campaign

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Campaign

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: INT(ICHAR(1A))

Product Maximum: INT(ICHAR(3K))

Description: The campaign. ie: for campaign L1A, it will be '1A'.Comments:

Product Var Name i\_spare40

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 40

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 40.

Product Var Name i\_cycTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cycle and Track

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 10001

Product Maximum: 9991354

Description: The track and cycle. On the product, they will be stored as one number: cccttt.

Comments:

Product Var Name i\_localSolarTime

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local apparent solar time

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 86400000

Description: Local apparent solar time.

Comments:

Product Var Name i\_spare41

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 41

Product Data Type: i4b (7)

Total Bytes: 28

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 41.

Product Var Name i\_deltaEllip

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta Ellipsoid

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -9000

Product Maximum: 9000

Description: Surface Elevation (T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).

Comments:

Product Var Name i\_beamCoelv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Co-elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot. 40Hz.

Comments:

Product Var Name i\_beamAzimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Azimuth

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000



Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.

Comments:

Product Var Name i\_d2refTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Distance to the reference ground track

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: m\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000000

Description: Distance to the reference ground track.

Comments:

Product Var Name i\_SigBegOff

Is element of: GLA14 Record

Short Description: Signal Begin Range Increment

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range increment to be added to reference range to obtain signal begin as computed in ground process using the alternate parameterization.

Comments:

Product Var Name i\_DEM\_hires\_src

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: High Resolution Source Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Flag to specify who the source provider was for the high resolution DEM. <br>

0 = no high res source available<br>

1 = unfinished research Shuttle Radar Topography Mission (SRTM)<br>

&nbsp; &nbsp; &nbsp; &nbsp; C-band 90 m DEM produced by JPL (+-1.1km E-W swath)<br>

2 = finished SRTM C-band 90 m DEM produced by NGA (+-2.1km E-W swath)<br>

3 = ICESat Greenland V1 1km DEM<br>

4 = ICESat Antarctica V1 500m DEM<br>

5 = 90m Canadian Digital Elevation Data (CDED)<br>

6 = 90m Canadian Digital Elevation Data (CDED) if available otherwise finished SRTM C-band 90 m DEM<br>

Comments: DEM elevations are referenced to the TOPEX/Poseidon ellipsoid and are directly comparable to the elevation on the GLAS products.

Product Var Name i\_DEMHiresArElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEMHiresArElv

Product Data Type: i2b (9, 40)

Total Bytes: 720

Product Units: meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500

Product Maximum: 1300

Description: d\_DEMHiresArElv is a 3 X 3 X 40 array of high resolution DEM values. The 1-40 index corresponds to 1/40 second samples. The 1-9 index corresponds to the position of the DEM value relative to the spot. Given the first 1/40 second of data, positional correspondence of the DEM element to the spot is as follows:<br>

<br>

The 9 points on the product correspond to the 3x3 points in the alg variable as follows:<br>

<br>

gla06%d\_DEMHiresArElv(1,1,k) = gla06\_prod%i\_DEMHiresArElv(1,k) NW<br>

gla06%d\_DEMHiresArElv(2,1,k) = gla06\_prod%i\_DEMHiresArElv(2,k) N<br>

gla06%d\_DEMHiresArElv(3,1,k) = gla06\_prod%i\_DEMHiresArElv(3,k) NE<br>

gla06%d\_DEMHiresArElv(1,2,k) = gla06\_prod%i\_DEMHiresArElv(4,k) W<br>

gla06%d\_DEMHiresArElv(2,2,k) = gla06\_prod%i\_DEMHiresArElv(5,k) center<br>

gla06%d\_DEMHiresArElv(3,2,k) = gla06\_prod%i\_DEMHiresArElv(6,k) E<br>

gla06%d\_DEMHiresArElv(1,3,k) = gla06\_prod%i\_DEMHiresArElv(7,k) SW<br>

gla06%d\_DEMHiresArElv(2,3,k) = gla06\_prod%i\_DEMHiresArElv(8,k) S<br>

gla06%d\_DEMhiresArElv(3,3,k) = gla06\_prod%i\_DEMhiresArElv(9,k) SE<br>

<br>

Comments:

Product Var Name i\_ElevBiasCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Bias Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments: See the altimeter user guide for full description.

Product Var Name i\_spare42

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 42

Product Data Type: i2b (4, 40)

Total Bytes: 320

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 42

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_Azimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: millideg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.

Comments:

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_tpintensity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse intensity - frame avg

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpazimuth\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse azimuth - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse eccentricity - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: Unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse major axis - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.

Comments:

Product Var Name i\_poTide

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Pole Tide

Product Data Type: i2b

Total Bytes: 2

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Pole tide: an ocean tide which is the result of the Chandler wobble (a free nutation of the Earth caused by fluctuating pressure on the bottom of the ocean, caused by temperature and salinity changes and wind-driven changes in the circulation of the oceans).

Comments:

Product Var Name i\_gdHt

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Geoid

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -20000

Product Maximum: 20000

Description: The height of the geoid above the ellipsoid for the first and last shot in the record.

Comments:

Product Var Name i\_erElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solid Earth Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The solid earth tide elevation for the first & last shot in the record.

Comments:

Product Var Name i\_spElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Tide Elevations, Specific

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.

Comments:

Product Var Name i\_IdElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Load Tide Elevation

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.

Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name i\_spare12

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spares 12

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: None

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_wTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction\_Wet Troposphere

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 0

Description: The range correction due to the wet troposphere at first & last shot.

Comments:

Product Var Name i\_dTrop



Is element of: GLA14 Record

Short Description: Range Correction, Dry Troposphere

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 0

Description: Atmospheric dry tropospheric delay correction added to the elevation. Validity is based on results of finding a range with the alternate fit.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see [flags/i\\_surfType.pdf](\"flags/i_surfType.pdf\") the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare11

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 11

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_DEM\_elv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: DEM Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -50000

Product Maximum: 1000000

Description: Elevation at the footprint location from the SRTM30 (GTOPO30 + SRTM) Digital Elevation Model (DEM). The reference frame for the DEM elevation was changed to the TOPEX/Poseidon ellipsoid to make it consistent with the GLAS elevations.

Comments:

Product Var Name i\_refRng

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Range in distance calculated from the time between the centroid of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.

Comments:

Product Var Name i\_spare47

Is element of: GLA06 record, GLA14 Record

Short Description: Spare 47

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information

.Comments:

Product Var Name i\_IdRngOff

Is element of: GLA06 record, GLA14 Record

Short Description: Land Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for land.

Comments:

Product Var Name i\_SigEndOff

Is element of: GLA14 Record

Short Description: Signal End Range Increment

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range increment to be added to reference range to signal end as computed in ground process using the alternate parameterization.

Comments:

Product Var Name i\_gpCntRngOff

Is element of: GLA14 Record

Short Description: Centroid Range Increment for all 6 peaks

Product Data Type: i4b (6, 40)

Total Bytes: 960

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: (Centroid Range Increment for all 6 peaks) is the array that contains the offsets of the Gaussian peaks with respect to the centroid range (Peak 6 to Peak 1, if you want from highest to lowest, first one is closest to the ground).

Centroid Range is the sum of reference range and Land range offset (which should be same as the centroid range offset).

Comments:

Product Var Name i\_reflctUC

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: reflctUC

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. i\_reflctUC has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity =  $i\_reflctUC * (i\_RecNrgAll + i\_satNrgCorr)/i\_RecNrgAll$ )<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.<br>

<br>

i\_reflctUC is invalid where GLA06%d\_satNrgCorr is invalid.<br>

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflCor\_atm

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i4b

Total Bytes: 4

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 250

Description: This reflectance correction factor is calculated as  $1 / e^{(-2(tc+ta+tp+tm))}$ , where tc is the cloud (column) integrated optical depth, ta is the aerosol (column) integrated optical depth, tp is the planetary boundary layer optical depth, and tm is the molecular optical depth. tm is a constant equal to  $-\log(gd\_T\_RTatm)/2$ , where  $gd\_T\_RTatm = 0.98$  is defined in const\_elev\_mod.f90 or read from ANC07-03. The attenuation correction factor has been corrected for multiple scattering. The reflectance has been corrected for waveform saturation.

Comments:

Product Var Name i\_maxSmAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_ocElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Ocean Tide Elevation

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The ocean tide elevation from the TPX07.1 tide model.

## Comments:

Product Var Name i\_numPk

Is element of: GLA14 Record

Short Description: Number of Peaks found in the Return

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: The number of peaks in the waveform produced by the Gaussian filtering, using alternate parameters.

## Comments:

Product Var Name i\_kurt1

Is element of: GLA05 record, GLA14 Record

Short Description: Kurtosis of Received Echo (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using alternative parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_skew1

Is element of: GLA05 record, GLA14 Record

Short Description: Skewness of Received Echo (alternative)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Skewness of the received echo from signal begin to signal end using alternative parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_spare4

Is element of: GLA06 record, GLA12 Record, GLA14 Record, GLA15 Record

Short Description: Spare 4

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Gamp

Is element of: GLA14 Record

Short Description: Amplitudes of Gaussians

Product Data Type: i4b (6, 40)

Total Bytes: 960

Product Units: 0.01 volts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 300

Description: Amplitude of each Gaussian solved for (up to six), using the alternate parameters.

Comments:

Product Var Name i\_Garea

Is element of: GLA14 Record

Short Description: Area under Gaussian

Product Data Type: i4b (6, 40)

Total Bytes: 960

Product Units: 0.01 volts \* ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 348457

Description: Area under each of the Gaussians solved for (up to six), using alternate parameters.

Comments:

Product Var Name i\_Gsigma

Is element of: GLA14 Record

Short Description: Sigma of Gaussians

Product Data Type: i4b (6, 40)

Total Bytes: 960

Product Units: 0.001 ns

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 327660

Description: Width (sigma) of each Gaussian solved for (up to six), using alternate parameters.

Comments:

Product Var Name i\_nPeaks1

Is element of: GLA05 record, GLA06 record, GLA14 Record

Short Description: Initial Number of Peaks in received echo (alternate)

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 50

Description: The initial number of peaks of the received echo; determined from the smoothed waveform, using alternative parameters

Comments:

Product Var Name i\_LandVar

Is element of: GLA14 Record

Short Description: Standard Deviation of the land Gaussian Fit

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless



Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The Standard deviation of the difference between the functional fit and the received echo using alternative parameters. It is directly taken from GLA05 parameter d\_wfFitSDev\_1 (alternative).

Comments:

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the [PDF file](flags/i_ElvuseFlg.pdf) for more information.

Comments:

Product Var Name i\_atm\_avail

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see [the PDF flag description in the next section](flags/i_atm_avail.pdf) for more details.

Comments:

Product Var Name i\_spare16

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 16

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cld1\_mswf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify 'invalid'. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically 'thick' cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range. Please see [flags/i\\_cld1\\_mswf\\_elv.pdf](\"#\") the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_MRC\_af

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Medium Resolution Cloud Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Tells how many cloud layers were found at this resolution from the 532 nm channel. Please see <a href='flags/i\_MRC\_af.pdf'> the PDF flag description in the next section for more details. This parameter is extracted from the i\_MRCL\_flag on GLA09.

Comments:

Product Var Name i\_spare9

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Spare 9

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFig

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see <a href='flags/i\_ElvFig.pdf'> the PDF flag description in the next section for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_rng\_UQF

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Offset Quality/Use Flag

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Data quality flag for the range offsets on this record.

Please see <a href='flags/i\_rng\_UQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <[a href='\"#\"'>flags/i\\_timecorflg.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see <[a href='\"#\"'>flags/i\\_AttFlg2.pdf](\"#\")> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare5

Is element of: GLA14 Record

Short Description: Spare 5

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <a href='flags/i\_FrameQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_rngCorrFlg`

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: `i1b (2)`

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_CorrStatFlg`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Correction Status Flag

Product Data Type: `i1b (2)`

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

Please see [the PDF flag description in the next section](#) for more details.

Comments:

Product Var Name `i_spare15`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 15

Product Data Type: `i1b (8)`

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Spare6

Is element of: GLA14 Record

Short Description: Spare 6

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA14 spare6.

Product Var Name i\_spare44



Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 44

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_satElevCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Elevation Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments:

Product Var Name i\_satCorrFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Correction Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: NA

Product Maximum: NA

Description: Please see [flags/i\\_satCorrFlg.pdf](flags/i_satCorrFlg.pdf) the PDF flag description in the next section for more details.<br>

<br>

Bits 0-3: i\_satElevCorr flag (4 bits); values indicated below: <br>

<br>

0= Not Saturated (i\_satNdx < 2) or No Signal<br>

1= Sat. Correction is Inconsequential (i\_satNdx >= 2 & i\_pctSat < 2.0)<br>

2= Sat. Correction is Applicable (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* < 100ns)<br>

3= Sat. Correction is Not Computable effects elevations can not be corrected<br>

4= Sat. Correction model is Not Applicable so data can not be corrected (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* >= 100ns) there are errors in the data but the effects on elevations can not be corrected <br>

<br>

values 5-15=TBD

Bits 4-5: i\_satNrgCorr flag (2 bits):<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

<br>

Bits 6-7: TBD:<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

Comments:

Product Var Name i\_satNrgCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Energy Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: .01fJ

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.

Comments:

Product Var Name i\_spare13

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record

Short Description: Spare 13

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: null

Invalid Value/Flag: null

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

Product Var Name i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

Product Var Name i\_FRir\_cldtop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 1 second record. This parameter is in GLA09.

Comments:

Product Var Name i\_FRir\_qaFlag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: One byte per data quality flag.

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_Frir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height. Please see [i\\_FRir\\_qaFlag.pdf](flags/i_FRir_qaFlag.pdf) the PDF flag description in the next section for more details. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere

0 clear

1 high cloud (> 5 km) low optical depth

2 high cloud (> 5 km), high optical depth

3 mid cloud (>2, <=5 km) low optical depth

4 mid cloud (>2, <=5 km) high optical depth

5 low cloud (> 500 m, <=2 km), low optical depth

6 low cloud (> 500 m, <=2 km), high optical depth

7 blowing snow or fog (< 500 m), low optical depth

8 blowing snow or fog (< 500 m), high optical depth

9 not tested

10 data quality insufficient to assign flag

## Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag

Comments: 0 Not applicable (for contamination flag values of 9 or 10)

1 low confidence

2 reasonable confidence

3 high confidence

Product Var Name i\_spare48

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 48

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

## Comments:

Product Var Name i\_FRir\_intsig

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: e7/(m-sr)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of 1.0e-7 (1/(m-sr) units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_spare14

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 14

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Atmospheric temperature at Earth's surface level measured in degrees Celsius and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Atmospheric pressure at Earth's surface level measured in hPa and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.

Comments:

Product Var Name i\_maxRecAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.



Product Var Name i\_sDevNsOb1

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

Product Var Name i\_spare8

Is element of: GLA14 Record

Short Description: i\_Spare8

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_isRngOff

Is element of: GLA06 record, GLA12 Record, GLA14 Record

Short Description: Ice Sheet Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to `i_refRng` to calculate the range using the algorithm deemed appropriate for ice sheets.

Comments: Can be used for comparing elevations computed from results standard and alternate fitting.

Product Var Name `i_pctSAT`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Percent Saturation

Product Data Type: `i1b` (40)

Total Bytes: 40

Product Units: percent

Invalid Value/Flag: `gi_invalid_i1b`

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: -127

Product Maximum: 127

Description: Percent saturation (`d_pctSAT`) is calculated using the formula:  $d\_pctSAT = 100 * (\text{saturation index}) / (\text{signal end} - \text{signal begin in nanoseconds})$ . The alternate signal end/begin are used for GLA14%`d_pctSAT`, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid `satElevCorr` values and `satCorrFlg` values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.

Comments:

Product Var Name `i_TxNrg`

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: `i2b` (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: `gi_invalid_i2b`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name `i_eqElv`

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Equilibrium Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -10000

Product Maximum: 10000

Description: The equilibrium (long period) tide at first and last valid shot over the ocean.

Comments:

Product Var Name i\_Spare7

Is element of: GLA14 Record

Short Description: Spare 7

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA14 spare7.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_transtime

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: One way transit time

Product Data Type: i2b

Total Bytes: 2

Product Units: microseconds

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4000

Description: One way transit time calculated using the preliminary range offset. This is added to the UTC time tag to get the ground bounce times at which to calculate the orbit

Comments:

Product Var Name i\_Spare1

Is element of: GLA15 Record

Short Description: Spare 1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA15 spare1.

Product Var Name i\_deltagpstmcor

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta GPS time correction

Product Data Type: i4b

Total Bytes: 4

Product Units: nanoseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000000

Product Maximum: 1000000

Description: The high frequency delta GPS time correction calculated during the precision orbit processing step.

Comments:

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_lat

Is element of: GLA15 Record

Short Description: Coordinate Data, Latitude, specific to ocean range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: The geodetic latitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ocean-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in degrees North.

Comments:

Product Var Name i\_lon

Is element of: GLA15 Record

Short Description: Coordinate Data, Longitude, specific to ocean range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000000

Description: The longitude of the forty laser spots in the 1 second time frame, computed from the Precision orbit determined GLAS laser antenna ground nadir coordinates, precision attitude, and ocean-specific range after all instrument corrections, atmospheric delays and tides have been applied. The values are in east longitude.

Comments:

Product Var Name i\_elev

Is element of: GLA15 Record

Short Description: Ocean Surface Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Surface elevation with respect to the ellipsoid at the spot location determined by range using the fitting algorithm after instrument corrections, atmospheric delays and tides have been applied.

Comments:

Product Var Name i\_campaign

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Campaign

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: INT(ICHR(1A))

Product Maximum: INT(ICHR(3K))

Description: The campaign. ie: for campaign L1A, it will be '1A'.

Comments:

Product Var Name i\_spare40

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 40

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 40.

Product Var Name i\_cycTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cycle and Track

Product Data Type: i4b

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 10001

Product Maximum: 9991354

Description: The track and cycle. On the product, they will be stored as one number: ccctttt.

Comments:

Product Var Name i\_localSolarTime

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local apparent solar time

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 86400000

Description: Local apparent solar time.

Comments:

Product Var Name i\_spare41

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 41

Product Data Type: i4b (7)

Total Bytes: 28

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 41.

Product Var Name i\_deltaEllip

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Delta Ellipsoid

Product Data Type: i2b (40)

Total Bytes: 80



Product Units: mm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -9000

Product Maximum: 9000

Description: Surface Elevation (T/P ellipsoid) minus Surface Elevation(WGS84 ellipsoid).

Comments:

Product Var Name i\_beamCoelv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Co-elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: Co-elevation (CE) is direction from vertical of the laser beam as seen by an observer located at the laser ground spot. 40Hz.

Comments:

Product Var Name i\_beamAzimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Azimuth

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: degrees\*100

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 36000

Description: The direction, eastwards from north, of the laser beam vector as seen by an observer at the laser ground spot viewing toward the spacecraft (i.e., the vector from the ground to the spacecraft). When the spacecraft is precisely at the geodetic zenith, the value will be 99999 degrees. 40 Hz.

Comments:

Product Var Name i\_d2refTrk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Distance to the reference ground track

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: m\*1000

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000000

Description: Distance to the reference ground track.

Comments:

Product Var Name i\_SigBegOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal Begin Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the beginning of signal (closest to the spacecraft) using standard parameters.

Comments:

Product Var Name i\_spare45

Is element of: GLA15 Record

Short Description: Spare 45

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

## Comments:

Product Var Name i\_spare46

Is element of: GLA15 Record

Short Description: Spare 46

Product Data Type: i2b (9, 40)

Total Bytes: 720

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

## Comments:

Product Var Name i\_ElevBiasCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Bias Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation based on post flight analysis for biases determined for each campaign. This bias correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments: See the altimeter user guide for full description.

Product Var Name i\_spare42

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 42

Product Data Type: i2b (4, 40)

Total Bytes: 320

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 42

Product Var Name i\_sigmaatt

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Quality Indicator

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6000

Description: Attitude quality indicator. Values: 0=good; 50=warning; 100=bad.

Comments: This indicator currently has only 3 values: 0, 50, and 100, leaving open the opportunity to use numbers in between for further resolution of the degradation as our knowledge improves.

Product Var Name i\_Azimuth

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Local Azimuth

Product Data Type: i4b

Total Bytes: 4

Product Units: millideg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Mean azimuth measured clockwise from north based on latitude, longitude, and elevation of a 1 second interval of the trace of the ground footprint-center.

Comments:

Product Var Name i\_SolAng

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solar Angle

Product Data Type: i4b

Total Bytes: 4

Product Units: microdeg

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90000000

Product Maximum: 90000000

Description: Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low-precision value, with approximately one degree accuracy.

Comments:

Product Var Name i\_tpintensity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse intensity - frame avg

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 25500

Description: Transmit pulse intensity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpazimuth\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse azimuth - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Transmit pulse azimuth. Average over the 1-second frame. Angle eastwards from north of the major axis of the transmit pulse, as seen by the LPA. From ANC09.

Comments:

Product Var Name i\_tpeccentricity\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse eccentricity - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: Unitless\*1000

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: Transmit pulse eccentricity as measured by the LPA. Average over the 1-second frame. From ANC09.

Comments:

Product Var Name i\_tpmajoraxis\_avg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Pulse major axis - frame avg

Product Data Type: i2b

Total Bytes: 2

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Transmit pulse major axis as measured by the LPA. Average over the 1-second time frame. From ANC09.

Comments:

Product Var Name i\_poTide

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Pole Tide

Product Data Type: i2b

Total Bytes: 2

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Pole tide: an ocean tide which is the result of the Chandler wobble (a free nutation of the Earth caused by fluctuating pressure on the bottom of the ocean, caused by temperature and salinity changes and wind-driven changes in the circulation of the oceans).

Comments:

Product Var Name i\_gdHt

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Geoid

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -20000

Product Maximum: 20000

Description: The height of the geoid above the ellipsoid for the first and last shot in the record.

Comments:

Product Var Name i\_erElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Solid Earth Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The solid earth tide elevation for the first & last shot in the record.

Comments:

Product Var Name i\_spElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Tide Elevations, Specific

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: A tide elevation calculated from alternate tide models for specific regions for shots 1, 11, 21, and 31.

Comments:

Product Var Name i\_IdElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Load Tide Elevation

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The load tide elevation applied to each shot. Elements 1-4 of the load tide vector are applied to shots 1-10, 11-20, 21-30, and 31-40, respectively.

Comments: The load tide is NOT NECESSARILY the load tide for shots 1,11,21,31. It is calculated for the first valid shot in each group of 10 and applied to all valid shots in the group.

Product Var Name i\_bathyElv

Is element of: GLA15 Record

Short Description: Bathymetry Elevation

Product Data Type: i4b

Total Bytes: 4

Product Units: cm

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 1000000

Description: Bathymetry Elevation

Comments:

Product Var Name i\_wTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record



Short Description: Range Correction\_Wet Troposphere

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 0

Description: The range correction due to the wet troposphere at first & last shot.

Comments:

Product Var Name i\_dTrop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Range Correction, Dry Troposphere

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2500

Product Maximum: 0

Description: The range correction due to the dry troposphere; one correction for each shot. Validity is based on results of finding a range with the standard fit.

Comments:

Product Var Name i\_surfType

Is element of: GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Region Type

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 15

Description: Describes the region type or types associated with each shot Ice Sheet, ocean, sea ice, or Land.

Please see [flags/i\\_surfType.pdf](flags/i_surfType.pdf) the PDF flag description in the next section for more details.

## Comments:

Product Var Name i\_Spare3

Is element of: GLA15 Record

Short Description: Spare 3

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA15 spare3.

Product Var Name i\_MSS\_elv

Is element of: GLA15 Record

Short Description: Mean Sea Surface Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: cm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -50000

Product Maximum: 1000000

Description: The mean sea surface elevation from GSFC's data file DNSC08MSS\_1min.mss.gz This is in reference to the TOPEX/Poseidon ellipsoid.

Comments:

Product Var Name i\_refRng

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reference Range

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400000000

Product Maximum: 1000000000

Description: Range in distance calculated from the time between the centroid of the transmit pulse and the farthest gate from the spacecraft of the received pulse. See the rngcorrflg to determine any corrections that have been applied.

Comments:

Product Var Name i\_TrshRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Threshold Retracker Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the threshold retracker location on the received echo using standard parameters.

Comments:

Product Var Name i\_ocRngOff

Is element of: GLA06 record, GLA15 Record

Short Description: Ocean Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Range offset to be added to i\_refRng to calculate the range using the algorithm deemed appropriate for oceans.

Comments:

Product Var Name i\_SigEndOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Signal End Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location on the received echo calculated as the end of signal (farthest from the spacecraft) using standard parameters.

Comments:

Product Var Name i\_cntRngOff

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Centroid Range Offset

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -150000

Product Maximum: 0

Description: Offset to be added to i\_refRng to give the range in distance to the location of the centroid of the received echo from signal begin through signal end defined by the standard parameters.

Comments:

Product Var Name i\_reflctUC

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: reflctUC

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: Unitless\*1E06

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: Reflectivity, not corrected for atmospheric effects, is calculated as  $Refl = R/T$ , where R is the received energy after it has been scaled for range, and T is the transmitted energy. i\_reflctUC has also been calibrated for gain non-linearity (only for non-saturated waveforms), ground truth calibration and boresight shift shadowing (BSS). It is not corrected for saturation effects. If the shot is saturated (satindex above 2) then to correct for saturation the reflectivity estimate needs to be multiplied by the ratio of the corrected energy to the uncorrected energy (sat corrected reflectivity =  $i\_reflctUC * (i\_RecNrgAll + i\_satNrgCorr)/i\_RecNrgAll$ )<br>

<br>

The atmospheric corrected reflectivity may be calculated from this uncorrected reflectivity by multiplying it by d\_reflCor\_atm.<br>

<br>

i\_reflctUC is invalid where GLA06%d\_satNrgCorr is invalid.<br>

Comments: This uses all signal between signal begin and signal end.

Product Var Name i\_reflCor\_atm

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Reflectivity Correction Factor For Atmospheric Effects

Product Data Type: i4b

Total Bytes: 4

Product Units: Unitless

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1

Product Maximum: 250

Description: This reflectance correction factor is calculated as  $1 / e^{-(2(tc+ta+tp+tm))}$ , where tc is the cloud (column) integrated optical depth, ta is the aerosol (column) integrated optical depth, tp is the planetary boundary layer optical depth, and tm is the molecular optical depth. tm is a constant equal to  $-\log(gd\_T\_RTatm)/2$ , where  $gd\_T\_RTatm = 0.98$  is defined in const\_elev\_mod.f90 or read from ANC07-03. The attenuation correction factor has been corrected for multiple scattering. The reflectance has been corrected for waveform saturation.

Comments:

Product Var Name i\_maxSmAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Peak Amplitude of Smoothed Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: The peak amplitude of the received echo after it has been smoothed to remove high frequency noise (see ATBD).

Comments: This is calculated after converting the return to voltage.

Product Var Name i\_ocElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Ocean Tide Elevation

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The ocean tide elevation from the TPX07.1 tide model.

Comments:

Product Var Name i\_numPk

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Number of Peaks found in the Return

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: The number of peaks in the return echo found by the Gaussian fitting procedure, using standard parameters.

Comments:

Product Var Name i\_skew2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Skewness

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: The skewness of the received echo from signal begin to signal end using standard parameters.

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_OcRufRMS

Is element of: GLA15 Record

Short Description: RMS of elevations used for 1-sec mean elevation

Product Data Type: i4b

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 120000

Description: The standard deviation of the up to 40 GLA15 ocean elevations measurements. Comments:

Product Var Name i\_OcMeanElev

Is element of: GLA15 Record

Short Description: Mean elevation over 1 sec

Product Data Type: i4b

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: 1 -sec mean elevation of the up to 40 GLA15 ocean elevations.

Comments:

Product Var Name i\_lowElev

Is element of: GLA15 Record

Short Description: Lowest Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Lowest elevation in footprint, with all corrections applied (corresponds to signal end) using standard parameters.

Comments:

Product Var Name i\_highElev

Is element of: GLA15 Record

Short Description: Highest Elevation

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500000

Product Maximum: 10000000

Description: Highest elevation in footprint, with all corrections applied (corresponds to signal begin) using standard parameters.

Comments:

Product Var Name i\_OceanVar

Is element of: GLA15 Record

Short Description: Standard Deviation of the ocean Gaussian Fit

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: microvolts\*10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The Standard deviation of the difference between the functional fit and the received echo using standard parameters. It is directly taken from GLA05 parameter d\_wfFitSDev\_2 (standard).

Comments:

Product Var Name i\_ElvuseFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation use flag

Product Data Type: i1b (5)

Total Bytes: 5

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127



Product Maximum: 127

Description: Flag indicating whether the elevations on this record should be used or not (1 bit set/shot). See the [PDF file](flags/i_ElvuseFlg.pdf) for more information.

Comments:

Product Var Name i\_atm\_avail

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Please see [the PDF flag description in the next section](flags/i_atm_avail.pdf) for more details.

Comments:

Product Var Name i\_spare16

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 16

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cld1\_mswf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Cloud Multiple Scattering Warning Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: The multiple scattering warning flag (MSWF) is based on the total column optical depth (aerosol plus cloud) calculated in GLA11 using 532nm. It is intended as a way to quickly obtain information about the potential severity of multiple scattering with regards to the range-to-surface calculated by the altimetry processing software. It will be output on the GLA11 product for use by the altimetry group. The multiple scattering warning flag will have values ranging from 0-14, based on the total column optical depth as detailed in the PDF.

A warning flag value of 15 will signify 'invalid'. An invalid will be encoded if an optical depth in any of the layers in the 1-second column could not be calculated. This usually occurs in a very optically 'thick' cloud which extinguishes the signal. It could also occur if the extinction-to-backscatter ratio assignment is set too high, causing the transmission calculations in the lidar inversion to go out-of-range. Please see [the PDF flag description in the next section](\"/flags/i_cld1_mswf_elv.pdf\") for more details.

Comments:

Product Var Name i\_MRC\_af

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Medium Resolution Cloud Availability Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Tells how many cloud layers were found at this resolution from the 532 nm channel. Please see [the PDF flag description in the next section](\"/flags/i_MRC_af.pdf\") for more details. This parameter is extracted from the i\_MRCL\_flag on GLA09.

Comments:

Product Var Name i\_spare9

Is element of: GLA15 Record

Short Description: spares

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_ElvFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Elevation Definition Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 127

Description: Indicates how location on the received echo was determined to calculate the elevation on the record.

Please see <a href='flags/i\_ElvFlg.pdf'> the PDF flag description in the next section for more details. 'For GLA05, 06 and 12,13,14 and 15, bits are set to reflect the range offset used for that products elevation. Although defined as a pass-thru, the values are different on GLA06/12,13,15 and GLA14.'

Comments:

Product Var Name i\_rng\_UQF

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Offset Quality/Use Flag

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Data quality flag for the range offsets on this record.

Please see <a href='flags/i\_rng\_UQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare49

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 49

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name `i_timecorflg`

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: `i2b`

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see [the PDF flag description in the next section](flags/i_timecorflg.pdf) for more details.

Comments:

Product Var Name `i_APID_AvFig`

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: `i1b (8)`

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_AttFlg2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 2

Product Data Type: i1b (20)

Total Bytes: 20

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: Denotes at 40/sec rate whether precision attitude was used to determine spot location, and if problems with LPA, etc.

Please see [i\\_AttFlg2.pdf](#) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare5

Is element of: GLA15 Record

Short Description: Spare 5

Product Data Type: i1b

Total Bytes: 1

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FrameQF

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Altimeter Frame Quality Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Denotes all bad data (no signal in whole frame), or all data good and all science team recommended corrections applied

Please see <a href='flags/i\_FrameQF.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_OrbFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: POD flag (Orbit Flag)

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: Denotes quality of orbit, whether predicted or precision, loss of GPS data, maneuver-degraded, etc.

Please see <a href='flags/i\_OrbFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_rngCorrFlg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Range Correction Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Denotes which geophysical or instrument corrections have been applied to the range in the calculation of the elevation on this record.

Please see <a href='flags/i\_rngCorrFlg.pdf'> the PDF flag description in the next section for more details.

Comments:

**Product Var Name** i\_CorrStatFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Correction Status Flag

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: For each geophysical correction that has multiple values denotes which algorithm or model was used.

Please see [the PDF flag description in the next section](flags/i_CorrStatFlg.pdf) for more details.

Comments:

**Product Var Name** i\_spare15

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 15

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

**Product Var Name** i\_AttFlg1

Is element of: GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Attitude Flag 1

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: At 1/sec denotes large off-nadir angle, ocn sweep, target of opportunity, steering to reference track.

Please see <a href='flags/i\_AttFlg1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_Spare6

Is element of: GLA15 Record

Short Description: Spare 6

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA15 spare6.

Product Var Name i\_satNdx

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Index

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: ns

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 126

Description: The count of the number of gates in a waveform which have an amplitude greater than or equal to i\_satNdxTh (set in anc07\_0004). The value 126 means 126 or more gates are above the saturation index threshold (i\_satNdxth).

Comments:

Product Var Name i\_satElevCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Elevation Correction

Product Data Type: i2b (40)



Total Bytes: 80

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Correction to elevation for saturated waveforms. This correction has not been applied to the data so to apply it SUBTRACT the correction from the range estimate. To apply the correction to the elevations it must be ADDED to the elevation estimates.

Comments:

Product Var Name i\_satCorrFlg

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Correction Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: NA

Product Maximum: NA

Description: Please see [flags/i\\_satCorrFlg.pdf](flags/i_satCorrFlg.pdf) the PDF flag description in the next section for more details.<br>

<br>

Bits 0-3: i\_satElevCorr flag (4 bits); values indicated below: <br>

<br>

0= Not Saturated (i\_satNdx < 2) or No Signal<br>

1= Sat. Correction is Inconsequential (i\_satNdx >= 2 & i\_pctSat < 2.0)<br>

2= Sat. Correction is Applicable (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* < 100ns)<br>

3= Sat. Correction is Not Computable effects elevations can not be corrected<br>

4= Sat. Correction model is Not Applicable so data can not be corrected (i\_satNdx >= 2 & i\_pctSat >= 2.0 & Full Width\* >= 100ns) there are errors in the data but the effects on elevations can not be corrected <br>

<br>

values 5-15=TBD

Bits 4-5: i\_satNrgCorr flag (2 bits):<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

<br>

Bits 6-7: TBD :<br>

0=TBD<br>

1=TBD<br>

2=TBD<br>

3=TBD<br>

Comments:

Product Var Name i\_satNrgCorr

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Saturation Energy Correction

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: .01fJ

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: Correction to energy for saturated waveforms. This correction has not been applied to the energy. It should be ADDED to any echo pulse energy calculated from the pulse area under the waveform. Also any reflectivity estimates need to be corrected for this error in energy measurement.

Comments:

Product Var Name i\_kurt2

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA15 Record

Short Description: Kurtosis of the Received Echo (standard)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: unitless \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 1000

Description: Kurtosis of the received echo from signal begin to signal end using standard parameters

Comments: Note that the received echo was calibrated and converted to voltage before calculation.

Product Var Name i\_gval\_rcv

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Gain Value used for Received Pulse

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Gain value used for received pulse - uncalibrated.

Comments: This value is in counts and needs to be calibrated before calculating energy from it. Same as variable in GLA01\_Long/i\_gainSet1064.

Product Var Name i\_RecNrgAll

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Received Energy signal begin to signal end

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 fJoules

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: This is a pass through of gla01%d\_recNrgAll\_EU, but stored in different units on the product. This is calculated by taking the area under the received waveform (referenced to the observed noise) from all responses between the noise crossing before the first threshold crossing and the noise crossing after the last threshold crossing. It is a rescaled value of GLA01 parameter d\_recNrgAll\_EU and is not recomputed.

Comments:

Product Var Name i\_FRir\_cldtop

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Cloud Top

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: deka-meters

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1030

Description: Full resolution (40 Hz) cloud top height obtained from the 1064 atmospheric channel. This parameter is for a 1 second record. This parameter is in GLA09.

Comments:

Product Var Name i\_FRir\_qaFlag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Quality Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: One byte per data quality flag.

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height. Please see [flags/i\\_FRir\\_qaFlag.pdf](#) the PDF flag description in the next section for more details. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_atm\_char\_flag

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10

Description: Flag to characterize cloud and blowing snow state of the atmosphere

0 clear

1 high cloud (> 5 km) low optical depth

2 high cloud (> 5 km), high optical depth  
3 mid cloud (>2, <=5 km) low optical depth  
4 mid cloud (>2, <=5 km) high optical depth  
5 low cloud (> 500 m, <=2 km), low optical depth  
6 low cloud (> 500 m, <=2 km), high optical depth  
7 blowing snow or fog (< 500 m), low optical depth  
8 blowing snow or fog (< 500 m), high optical depth  
9 not tested  
10 data quality insufficient to assign flag

Comments:

Product Var Name i\_atm\_char\_conf

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Atmosphere Characterization Flag Confidence

Product Data Type: i2b

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Confidence level ascribed to the atmosphere characterization flag

Comments: 0 Not applicable (for contamination flag values of 9 or 10)

1 low confidence  
2 reasonable confidence  
3 high confidence

Product Var Name i\_spare48

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 48

Product Data Type: i1b (36)

Total Bytes: 36

Product Units: n/a

Invalid Value/Flag: n/a

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: n/a

Product Maximum: n/a

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_FRir\_intsig

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Full Resolution 1064 Integrated Signal

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: e7/(m-sr)

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Though called 'integrated signal' this is actually an average of all bins in the above-ground portion of the 1064 40 Hz profile with values above the threshold of  $1.0e-7$  (1/(m-sr) units). This parameter is for a 1 second record. This parameter is extracted from the equivalent parameter on GLA09.

Comments:

Product Var Name i\_spare14

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Spare 14

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: Unknown

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Surface\_temp

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees Celsius \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 10000

Description: Atmospheric temperature at Earth's surface level measured in degrees Celsius and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_pres

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Surface Pressure

Product Data Type: i2b

Total Bytes: 2

Product Units: hPa \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Atmospheric pressure at Earth's surface level measured in hPa and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_relh

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Relative Humidity

Product Data Type: i2b

Total Bytes: 2

Product Units: percentage \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Atmospheric relative humidity at Earth's surface level measured as a percentage and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wind

Is element of: GLA07 Record, GLA15 Record

Short Description: Surface Wind Speed

Product Data Type: i2b

Total Bytes: 2

Product Units: meters/second \* 100

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 20000

Description: Wind speed at Earth's surface level measured in km/hour and derived from the meteorological data files.

Comments:

Product Var Name i\_Surface\_wdir

Is element of: GLA07 Record, GLA15 Record

Short Description: Surface Wind Direction Azimuth from North

Product Data Type: i2b

Total Bytes: 2

Product Units: degrees \* 10

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: Wind direction at Earth's surface level measured in degrees of azimuth from North and derived from the meteorological data files.

Comments:

Product Var Name i\_maxRecAmp

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Max Amplitude of Received Echo

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: Tenth of millivolts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: 30000

Description: Maximum Amplitude of the Received Echo.

Comments: This is calculated after converting the return to voltage. Use for scaling model fit RMS between normalized and un-normalized units.



## Product Var Name i\_sDevNsOb1

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Standard deviation of 1064 nm Background noise, (alternate)

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.0001 volts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 30000

Description: The standard deviation of the background noise (alternative parameters).

Comments: Can be used for computing signal-to-noise ratio along with unsmoothed max amplitude.

## Product Var Name i\_spare4

Is element of: GLA06 record, GLA12 Record, GLA14 Record, GLA15 Record

Short Description: Spare 4

Product Data Type: i1b (160)

Total Bytes: 160

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

## Product Var Name i\_pctSAT

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Percent Saturation

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: percent

Invalid Value/Flag: gi\_invalid\_i1b

Is Correction Flag?: Yes

Is Unsigned?: NA

Product Minimum: -127

Product Maximum: 127

Description: Percent saturation (d\_pctSAT) is calculated using the formula:  $d\_pctSAT = 100 * (\text{saturation index}) / (\text{signal end} - \text{signal begin in nanoseconds})$ . The alternate signal end/begin are used for GLA14% d\_pctSAT, while the standard fit values are used for GLA06, 12, 13, and 15. The Saturation elevation correction is not applied in the geolocation processing computation of lat, lon and elev. Because the saturation corrections are small and data is acquired within 5 deg off nadir, effects on lat and lon can be ignored. To apply the saturation elevation correction to the elevations on the products it must be ADDED to the elevation estimates. Reported elevations for returns with invalid satElevCorr values and satCorrFlg values of 3 or 4 are likely to have large, uncorrectable errors and should be excluded from analyses.

Comments:

Product Var Name i\_TxNrg

Is element of: GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: 1064 nm Laser Transmit Energy

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: 0.01 millijoules

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32766

Description: The 1064 nm laser pulse transmitted energy in energy units, computed from the digitized outgoing pulse, and the transmit gain.

Comments:

Product Var Name i\_eqElv

Is element of: GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Equilibrium Tide Elevation (at first & last shot)

Product Data Type: i2b (2)

Total Bytes: 4

Product Units: mm

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: NA

Is Unsigned?: NA

Product Minimum: -10000

Product Maximum: 10000

Description: The equilibrium (long period) tide at first and last valid shot over the ocean.

Comments:

Product Var Name i\_spare2

Is element of: GLA15 Record

Short Description: Spare 2

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA15 spare2.

Product Var Name i\_gASP

Is element of: GLA15 Record

Short Description: Global Mean Atmospheric Pressure

Product Data Type: i4b

Total Bytes: 4

Product Units: .001 Pa

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 10000000

Product Maximum: 120000000

Description:

Comments:

Product Var Name i\_Spare7

Is element of: GLA15 Record

Short Description: Spare 7

Product Data Type: i1b (144)

Total Bytes: 144

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA15 spare7.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole

number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_phdr\_20

Is element of: GLA03 Main Record

Short Description: Primary Header APID 20

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 20

Comments:

Product Var Name i\_shdr\_20

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 20 (time stamp)

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 20 (time stamp)

Comments:

Product Var Name i\_g\_nrg

Is element of: GLA03 Main Record

Short Description: 532 Energy Throughput

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Percent X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description: 532 Energy

Comments:

Product Var Name i\_Lsr1Osc\_t

Is element of: GLA03 Main Record

Short Description: Laser Oscillator Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Laser Oscillator Temperature

Comments:

Product Var Name i\_Lsr1Dblr\_t

Is element of: GLA03 Main Record

Short Description: Laser Doubler Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Laser Doubler Temperature

Comments:

Product Var Name i\_LMB1Ref\_t

Is element of: GLA03 Main Record

Short Description: LMB Reference Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Laser Monitor Board (LMB) Reference Temperature

Comments:

Product Var Name i\_L1Elec\_t

Is element of: GLA03 Main Record

Short Description: Electronics Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Electronics Temperature (MEU)

Comments:

Product Var Name i\_LsrOsc\_c

Is element of: GLA03 Main Record

Short Description: Laser Oscillator Current

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Amps

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 145

Description: Laser Osc Current

Comments:

Product Var Name i\_LsrAmp\_c

Is element of: GLA03 Main Record

Short Description: Laser Amplifier Current

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Amps

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 145

Description: Laser Amp Current

Comments:

Product Var Name i\_LsrDr\_pw

Is element of: GLA03 Main Record

Short Description: Laser Drive Pulse Width

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: pw in microsec

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 145

Description: Laser Dr Pulse Width

Comments:

Product Var Name i\_Lsr2Osc\_t

Is element of: GLA03 Main Record

Short Description: Oscillator Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_Lsr2Dblr\_t

Is element of: GLA03 Main Record

Short Description: Laser Doubler Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:



## Comments:

Product Var Name i\_LMB2Ref\_t

Is element of: GLA03 Main Record

Short Description: LMB Reference Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_L2Elect\_t

Is element of: GLA03 Main Record

Short Description: Electronics Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_Lsr3Osc\_t

Is element of: GLA03 Main Record

Short Description: Oscillator Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_Lsr3Dblr\_t

Is element of: GLA03 Main Record

Short Description: Laser Doubler Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_LMB3Ref\_t

Is element of: GLA03 Main Record

Short Description: LMB Reference Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_L3Elect\_t

Is element of: GLA03 Main Record

Short Description: Electronics Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description:

Comments:

Product Var Name i\_PrimAD550v

Is element of: GLA03 Main Record

Short Description: Primary Altimeter Detector 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: Primary Altimeter Detector 550 V

Comments:

Product Var Name i\_SecAD550v

Is element of: GLA03 Main Record

Short Description: Secondary Altimeter Detector 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: Secondary Altimeter Detector 550 V

Comments:

Product Var Name i\_spcm1\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #1 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #1 550 V

Comments:

Product Var Name i\_spcm2\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #2 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #2 550 V

Comments:

Product Var Name i\_spcm3\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #3 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #3 550 V

Comments:

Product Var Name i\_spcm4\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #4 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #4 550 V

Comments:

Product Var Name i\_spcm5\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #5 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #5 550 V

Comments:

Product Var Name i\_spcm6\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #6 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #6 550 V

Comments:

Product Var Name i\_spcm7\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #7 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #7 550 V

Comments:

Product Var Name i\_spcm8\_550v

Is element of: GLA03 Main Record

Short Description: SPCM Detector #8 550V Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 53500

Product Maximum: 56500

Description: SPCM Detector #8 550 V

Comments:

Product Var Name i\_Int1\_t

Is element of: GLA03 Main Record

Short Description: Internal Temperature #1

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 145

Description: Internal Temp #1

Comments:

Product Var Name i\_ct\_prail\_v

Is element of: GLA03 Main Record

Short Description: C & T Positive Rail

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -10000

Product Maximum: 20000

Description:

Comments:

Product Var Name i\_Int3\_t

Is element of: GLA03 Main Record

Short Description: Internal Temperature #3

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 105

Product Maximum: 145

Description: Internal Temp #3

Comments:

Product Var Name i\_VCXmtr\_c

Is element of: GLA03 Main Record

Short Description: VC X Motor Current

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: milliAmps

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 150

Product Maximum: 200

Description: VC X Motor Current

## Comments:

Product Var Name i\_VCYmtr\_c

Is element of: GLA03 Main Record

Short Description: VC Y Motor Current

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: milliAmps

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 150

Product Maximum: 200

Description: VC Y Motor Current

## Comments:

Product Var Name i\_Xpos

Is element of: GLA03 Main Record

Short Description: X Position

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3600

Description: X Position

## Comments:

Product Var Name i\_Ypos

Is element of: GLA03 Main Record

Short Description: Y Position

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0



Product Maximum: 3600

Description: Y Position

Comments:

Product Var Name i\_ADdetOutGn

Is element of: GLA03 Main Record

Short Description: Transmitted Gain

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: The transmitted gain value. The AD Detector Outgoing Gain readback. Commanded value; repeats for 4 seconds. From APID 20, Offset 29.

Comments:

Product Var Name i\_ADdetRetGn

Is element of: GLA03 Main Record

Short Description: AD Detector Return Gain readback

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: AD Detector Return Gain readback

Comments:

Product Var Name i\_DPInA

Is element of: GLA03 Main Record

Short Description: Dual Pin -A Throughput

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Percent X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Dual Pin -A

Comments:

Product Var Name i\_DPinB

Is element of: GLA03 Main Record

Short Description: Dual Pin -B Throughput

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Percent X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: Dual Pin -B

Comments:

Product Var Name i\_Laser1\_stat

Is element of: GLA03 Main Record

Short Description: Laser 1 Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Indicates whether Laser 1 is enabled or disabled. Value of 0 = enabled; 1 = disabled.

Comments:

Product Var Name i\_Laser2\_stat

Is element of: GLA03 Main Record

Short Description: Laser 2 Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Indicates whether Laser 2 is enabled or disabled. Value of 0 = enabled; 1 = disabled.

Comments:

Product Var Name i\_Laser3\_stat

Is element of: GLA03 Main Record

Short Description: Laser 3 Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Indicates whether Laser 3 is enabled or disabled. Value of 0 = enabled; 1 = disabled.

Comments:

Product Var Name i\_OTs\_stat

Is element of: GLA03 Main Record

Short Description: OTS Enable Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Indicates whether OTS is enabled or disabled. Value of 0 = enabled; 1 = disabled.

Comments:

Product Var Name i\_phdr\_21

Is element of: GLA03 Main Record

Short Description: Primary Header APID 21

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 21

Comments:

Product Var Name i\_shdr\_21

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 21 (time stamp)

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 21 (time stamp)

Comments:

Product Var Name i\_BusAInst\_28v

Is element of: GLA03 Main Record

Short Description: +28V Bus A Instrument Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2400

Product Maximum: 3200

Description: +28V Bus A Instrument

Comments:

Product Var Name i\_HBSupp\_c

Is element of: GLA03 Main Record

Short Description: Hybrid Supplies Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1200

Product Maximum: 1500

Description: Hybrid Supplies

Comments:

Product Var Name i\_HVPSDetSup\_c

Is element of: GLA03 Main Record

Short Description: HVPS Detector Supplies Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2200

Product Maximum: 2800

Description: HVPS Detector Supplies

Comments:

Product Var Name i\_OpHtr\_c

Is element of: GLA03 Main Record

Short Description: Operational Heaters Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400

Product Maximum: 600

Description: Operational Heaters

Comments:

Product Var Name i\_MechSys\_c

Is element of: GLA03 Main Record

Short Description: Mechanical System Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1200

Description: Mechanical System

Comments:

Product Var Name i\_BusBL1\_v

Is element of: GLA03 Main Record

Short Description: +28V Bus B Laser 1 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2400

Product Maximum: 3200

Description: +28V Bus B Laser 1

Comments:

Product Var Name i\_BusBL1\_c

Is element of: GLA03 Main Record

Short Description: +28V Bus B Laser 1 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1200

Description: +28V Bus B Laser 1

## Comments:

Product Var Name i\_BusCL2\_v

Is element of: GLA03 Main Record

Short Description: +28V Bus C Laser 2 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2400

Product Maximum: 3200

Description: +28V Bus C Laser 2

Comments:

Product Var Name i\_BusCL2\_c

Is element of: GLA03 Main Record

Short Description: +28V Bus C Laser 2 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1200

Description: +28V Bus C Laser 2

Comments:

Product Var Name i\_BusDL3\_v

Is element of: GLA03 Main Record

Short Description: +28V Bus D Laser 3 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2400

Product Maximum: 3200

Description: +28V Bus D Laser 3

Comments:

Product Var Name i\_BusDL3\_c

Is element of: GLA03 Main Record

Short Description: +28V Bus D Laser 3 Voltage

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1200

Description: +28V Bus D Laser 3

Comments:

Product Var Name i\_5VHb1\_v

Is element of: GLA03 Main Record

Short Description: + 5 V Hybrid # 1 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400

Product Maximum: 600

Description: + 5 V Hybrid # 1

Comments:

Product Var Name i\_5VHb1\_c

Is element of: GLA03 Main Record

Short Description: + 5 V Hybrid # 1 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA



Is Unsigned?: No

Product Minimum: 50

Product Maximum: 150

Description: + 5 V Hybrid # 1

Comments:

Product Var Name i\_12VHb2\_v

Is element of: GLA03 Main Record

Short Description: +12 V Hybrid # 2 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1100

Product Maximum: 1300

Description: +12 V Hybrid # 2

Comments:

Product Var Name i\_12VHb2\_c

Is element of: GLA03 Main Record

Short Description: + 12 V Hybrid # 2 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 150

Product Maximum: 250

Description: + 12 V Hybrid # 2

Comments:

Product Var Name i\_n12VHb3\_v

Is element of: GLA03 Main Record

Short Description: - 12 V Hybrid # 3 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1300

Product Maximum: -1100

Description: - 12 V Hybrid # 3

Comments:

Product Var Name i\_n12VHb3\_c

Is element of: GLA03 Main Record

Short Description: - 12 V Hybrid # 3 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 250

Description: - 12 V Hybrid # 3

Comments:

Product Var Name i\_5VHb4\_v

Is element of: GLA03 Main Record

Short Description: + 5 V Hybrid # 4 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 400

Product Maximum: 600

Description: + 5 V Hybrid # 4

Comments:

Product Var Name i\_5VHb4\_c

Is element of: GLA03 Main Record

Short Description: + 5 V Hybrid # 4 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 50

Product Maximum: 150

Description: + 5 V Hybrid # 4

Comments:

Product Var Name i\_n5VHb5\_v

Is element of: GLA03 Main Record

Short Description: - 5 V Hybrid # 5 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -600

Product Maximum: -400

Description: - 5 V Hybrid # 5

Comments:

Product Var Name i\_n5VHb5\_c

Is element of: GLA03 Main Record

Short Description: - 5 V Hybrid # 5 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 150

Description: - 5 V Hybrid # 5

Comments:

Product Var Name i\_n5VHb6\_v

Is element of: GLA03 Main Record

Short Description: - 5 V Hybrid # 6 Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -600

Product Maximum: -400

Description: - 5 V Hybrid # 6

Comments:

Product Var Name i\_n5VHb6\_c

Is element of: GLA03 Main Record

Short Description: - 5 V Hybrid # 6 Current

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 150

Description: - 5 V Hybrid # 6

Comments:

Product Var Name i\_15VBPR\_v

Is element of: GLA03 Main Record

Short Description: + 15 V Boost Post Register Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 1400

Product Maximum: 1600

Description: + 15 V Boost Post Reg

Comments:

Product Var Name i\_n15VBPR\_v

Is element of: GLA03 Main Record

Short Description: - 15 V Boost Post Register Current

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1600

Product Maximum: -1400

Description: - 15 V Boost Post Reg

Comments:

Product Var Name i\_12VPOscTC\_c

Is element of: GLA03 Main Record

Short Description: 12V Prim Osc Thermal Control

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 150

Product Maximum: 250

Description: +12 V Prim Osc Thermal Control

Comments:

Product Var Name i\_12VSOscTC\_c

Is element of: GLA03 Main Record

Short Description: 12V Sec Osc Thermal Control

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 150

Product Maximum: 250

Description: +12 V Sec Osc Thermal Control

## Comments:

Product Var Name i\_n2VDV\_v

Is element of: GLA03 Main Record

Short Description: -2 V Discrete Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -300

Product Maximum: -100

Description: -2 V Discrete Voltage

Comments:

Product Var Name i\_HbHS\_t

Is element of: GLA03 Main Record

Short Description: Hybrid Heatsink Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: Hybrid Heatsink

Comments:

Product Var Name i\_FETSbHS\_t

Is element of: GLA03 Main Record

Short Description: FET Switch Bank Heatsink Temperature

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3000

Description: FET Switch Bank Heatsink

Comments:

Product Var Name i\_PrimOsc\_Stat

Is element of: GLA03 Main Record

Short Description: Primary Oscillator Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Status of Primary Oscillator from FET switch bank status. Value of 0 indicates off; value of 1 indicates on.

Comments:

Product Var Name i\_SecOsc\_Stat

Is element of: GLA03 Main Record

Short Description: Secondary Oscillator Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Status of secondary Oscillator from FET switch bank status. Value of 0 indicates off; value of 1 indicates on.

Comments:

Product Var Name i\_PrimAD\_Stat

Is element of: GLA03 Main Record

Short Description: Primary Altimeter Digitizer Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Status of Primary altimeter digitizer from FET switch bank status. Value of 0 indicates off; value of 1 indicates on.

Comments:

Product Var Name i\_SecAD\_Stat

Is element of: GLA03 Main Record

Short Description: Secondary Altimeter Digitizer Status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Status of secondary altimeter digitizer from FET switch bank status. Value of 0 indicates off; value of 1 indicates on.

Comments:

Product Var Name i\_0VHVPSRef\_v

Is element of: GLA03 Main Record

Short Description: HVPS +0 Volts Reference Voltage

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -500

Product Maximum: 500

Description: HVPS +0 Volts Reference

Comments:

Product Var Name i\_5VHVPSRef\_v

Is element of: GLA03 Main Record

Short Description: HVPS +5 V Reference Voltage

Product Data Type: i2b (4)

Total Bytes: 8



Product Units: Volts X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000

Description: HVPS +5 V Reference

Comments:

Product Var Name i\_OptSensSt

Is element of: GLA03 Main Record

Short Description: Optical Sensor Status

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4095

Description: Indicates status of primary and secondary laser select mechanisms and altimeter digitizer detectors.

Comments:

Product Var Name i\_CmdTlmStat

Is element of: GLA03 Main Record

Short Description: Command Telemetry Status

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65535

Description: Status of MCS board commandable telemetry.

Comments:

Product Var Name i\_PDUPMonCal1

Is element of: GLA03 Main Record

Short Description: Primary Monitor Calibration

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Primary Monitor Calibration

Comments:

Product Var Name i\_PDUPMonCal2

Is element of: GLA03 Main Record

Short Description: Primary Monitor Calibration

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Primary Monitor Calibration

Comments:

Product Var Name i\_PDUSMonCal1

Is element of: GLA03 Main Record

Short Description: Secondary Monitor Calibration

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Secondary Monitor Calibration

Comments:

Product Var Name i\_PDUSMonCal2

Is element of: GLA03 Main Record

Short Description: Secondary Monitor Calibration

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Secondary Monitor Calibration

Comments:

Product Var Name i\_ctrinfo

Is element of: GLA03 Main Record

Short Description: Counter info

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 15

Description: MCS MUX Counter (only uses 4 lower bits).

Comments:

Product Var Name i\_phdr\_22

Is element of: GLA03 Main Record

Short Description: Primary Header APID 22

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 22

Comments:

Product Var Name i\_shdr\_22

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 22 (time stamp)

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 22 (time stamp)

Comments:

Product Var Name i\_HkBdC0\_t

Is element of: GLA03 Main Record

Short Description: Housekeeping Board Temperature, Ch 0

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Housekeeping Board Temperature, Ch 0

Comments:

Product Var Name i\_IPSBdC1\_t

Is element of: GLA03 Main Record

Short Description: Instrument Processor System Board Temperature, Ch 1

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Instrument Processor System Board Temperature, Ch 1

Comments:

Product Var Name i\_PCBdC2\_t

Is element of: GLA03 Main Record

Short Description: Photon Counter Board Temperature, Ch 2

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Photon Counter Board Temperature, Ch 2

Comments:

Product Var Name i\_CDFTBdC3\_t

Is element of: GLA03 Main Record

Short Description: Cloud Digitizer/Frequency & Time Board Temperature, Ch 3

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Cloud Digitizer/Frequency & Time Board Temperature, Ch 3

Comments:

Product Var Name i\_AD1DSPC4\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 1 DSP Temperature, Ch 4

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 1 Board Temperature, Ch 4

Comments:

Product Var Name i\_AD2DSPC5\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 2 DSP Temperature, Ch 5

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature, Ch 5

Comments:

Product Var Name i\_DCHBdC6\_t

Is element of: GLA03 Main Record

Short Description: Data Collection & Handling Board Temperature, Ch6

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature 1, Ch 6

Comments:

Product Var Name i\_LMBdC7\_t

Is element of: GLA03 Main Record

Short Description: Laser Monitor Board Temperature, Ch 7

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature 2, Ch 7

Comments:

Product Var Name i\_TCMBdC8\_t

Is element of: GLA03 Main Record

Short Description: Temperature Controller Monitor Board Temperature, Ch 8

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Data Collection & Handling Board Temperature, Ch 8

Comments:

Product Var Name i\_OXCO1BdC9\_t

Is element of: GLA03 Main Record

Short Description: Oven-crystal-controlled Oscillator (OXCO) 1 Board Temperature, Ch 9

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Laser Monitor Board Temperature, Ch 9

Comments:

Product Var Name i\_OXCO2BdC10\_t

Is element of: GLA03 Main Record

Short Description: Oven-crystal-controlled Oscillator (OXCO) 2 Board Temperature, Ch 10

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Temperature Controller Monitor Board Temperature, Ch 10

Comments:

Product Var Name i\_OscBdC11\_t

Is element of: GLA03 Main Record

Short Description: Oscillator Board Temperature, Ch 11

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Oven-crystal-controlled Oscillator (OXCO) 1 Board Temperature, Ch 11

Comments:

Product Var Name i\_OTSBdC12\_t

Is element of: GLA03 Main Record

Short Description: Optical Test Source (OTS) Board Temperature, Ch 12

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Oven-crystal-controlled Oscillator (OXCO) 2 Board Temperature, Ch 12

Comments:

Product Var Name i\_LPAC13\_t1

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Laser Profiler Array (LPA) Temperature 1, Ch 13



Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Oscillator Board Temperature, Ch 13

Comments:

Product Var Name i\_LPAC14\_t2

Is element of: GLA03 Main Record

Short Description: Laser Profiler Array (LPA) Temperature 2, Ch 14

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Optical Test Source (OTS) Board Temperature, Ch 14

Comments:

Product Var Name i\_AD1eclaC15\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 1 ECLA Temperature, Ch 15

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Laser Profiler Array (LPA) Temperature 1, Ch 15

Comments:

Product Var Name i\_AD2eclaC16\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 2 ECLA Temperature, Ch 16

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Laser Profiler Array (LPA) Temperature 2, Ch 16

Comments:

Product Var Name i\_AD1eclbC17\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 1 ECLB Temperature, Ch 17

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 1 Board Temperature 3, Ch 17

Comments:

Product Var Name i\_AD2eclbC18\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 2 ECLB Temperature, Ch 18

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature 3, Ch 18

Comments:

Product Var Name i\_AD1ADCC19\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 1 ADC Temperature, Ch 19

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 1 Board Temperature 4, Ch 19

Comments:

Product Var Name i\_AD2ADCC20\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Digitizer 2 ADC Temperature, Ch 20

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature 4, Ch 20

Comments:

Product Var Name i\_lid\_box\_t

Is element of: GLA03 Main Record

Short Description: Lidar Box Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Lidar Box Temperature

Comments:

Product Var Name i\_PRTtelmtC22t

Is element of: GLA03 Main Record

Short Description: PRT, Telescope Mount Temperature, Ch 22

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Altimeter Digitizer 2 Board Temperature 5, Ch 22

Comments:

Product Var Name i\_PRTtelbfC23t

Is element of: GLA03 Main Record

Short Description: PRT, Telescope Baffle Temperature, Ch 23

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: HK Tlm Channel 23- Spare

Comments:

Product Var Name i\_PRTad1C24\_t

Is element of: GLA03 Main Record

Short Description: PRT, Altimeter Detector 1 Temperature, Ch 24

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Gyro Temperature, Ch 24

Comments:

Product Var Name i\_PRTad2C25\_t

Is element of: GLA03 Main Record

Short Description: PRT, Altimeter Detector 2 Temperature, Ch 25

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Star Camera Temperature, Ch 25

Comments:

Product Var Name iF1LTRSRSC26\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: PRT, Face 1 LTR to SRS Temperature, Ch26

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Stellar Reference System (SRS) Temperature, Ch 26

Comments:

Product Var Name iF2LTRSRSC27\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: PRT, Face 2 LTR to SRS Temperature, Ch27

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Lidar Detector Pkg? Temperature, Ch 27

Comments:

Product Var Name i\_srs\_ff\_optio\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: SRS First Fold Optics Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: SRS First Fold Optics Temperature

Comments:

Product Var Name i\_PRTfboxC29\_t

Is element of: GLA03 Main Record

Short Description: PRT, Fiber Box Temperature, Ch 29

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Altimeter Detector 2 Temperature, Ch 29

Comments:

Product Var Name i\_F1fabC30\_t

Is element of: GLA03 Main Record

Short Description: PRT, Face 1 Fold Around Bench Temperature, Ch 30

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Spacecraft Interface Temperature, Ch 30

Comments:

Product Var Name i\_F2fabC31\_t

Is element of: GLA03 Main Record

Short Description: PRT, Face 2 Fold Around Bench Temperature, Ch 31

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Telescope Mount Temperature, Ch 31

Comments:

Product Var Name iF1LTRCRSC32\_t

Is element of: GLA03 Main Record

Short Description: PRT, Face 1 LTR CRS Temperature, Ch 32

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Telescope Baffle Temperature, Ch 32

Comments:

Product Var Name iF2LTRCRSC33\_t

Is element of: GLA03 Main Record

Short Description: PRT, Face 2 LTR CRS Temperature, Ch 33

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT Temperature Region 10, Ch 33, Spare

Comments:

Product Var Name i\_SRSparC34\_t

Is element of: GLA03 Main Record

Short Description: PRT, Stellar Reference System (SRS) Parabola Temperature, Ch 34

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT Temperature Region 11, Ch 34, Spare

Comments:

Product Var Name i\_PRTCalLC35\_t

Is element of: GLA03 Main Record

Short Description: PRT Cal Low Temperature, Ch 35

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT Cal Low Temperature, Ch 35

Comments:

Product Var Name i\_PRTCalHC36\_t



Is element of: GLA03 Main Record

Short Description: PRT Cal High Temperature, Ch 36

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT Cal High Temperature, Ch 36

Comments:

Product Var Name i\_PDBiasC38\_v

Is element of: GLA03 Main Record

Short Description: Pin Diode Bias Voltage, Ch 38

Product Data Type: i2b

Total Bytes: 2

Product Units: Volt X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200

Description: Pin Diode Bias Voltage, Ch 38

Comments:

Product Var Name iAD1HSRamC39\_t

Is element of: GLA03 Main Record

Short Description: AD1 High Speed Ram Temperature, Ch 39

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200

Description: AD1 High Speed Ram Temperature, Ch 39

Comments:

Product Var Name i\_spare22\_1

Is element of: GLA03 Main Record

Short Description: Spare22 1

Product Data Type: i1b (12)

Total Bytes: 12

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spares in telemetry packet. 3 1-byte spares: GHKSPARE1-GHKSPARE5.

Product Var Name i\_phdr\_23

Is element of: GLA03 Main Record

Short Description: Primary Header APID 23

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 23

Comments:

Product Var Name i\_shdr\_23

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 23 (time stamp)

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 23 (time stamp)

Comments:

Product Var Name i\_tlm\_spare1

Is element of: GLA03 Main Record

Short Description: TLM Spare1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_lsm1\_t

Is element of: GLA03 Main Record

Short Description: Laser Select Mechanism #1 Temperature

Product Data Type: i4b

Total Bytes: 4

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2000

Product Maximum: 6000

Description: Laser Select Mechanism #1 Temperature

Comments:

Product Var Name i\_lsm2\_t

Is element of: GLA03 Main Record

Short Description: Laser Select Mechanism #2 Temperature

Product Data Type: i4b

Total Bytes: 4

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2000

Product Maximum: 6000

Description: Laser Select Mechanism #2 Temperature

Comments:

Product Var Name i\_adsm\_t

Is element of: GLA03 Main Record

Short Description: Altimeter Detector Select Mechanism Temperature

Product Data Type: i4b

Total Bytes: 4

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2000

Product Maximum: 6000

Description: Altimeter Detector Select Mechanism Temperature

Comments:

Product Var Name i\_lbsme\_t

Is element of: GLA03 Main Record

Short Description: Laser Beam Select Mech Electronics Temperature

Product Data Type: i4b

Total Bytes: 4

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2000

Product Maximum: 6000

Description: Laser Beam Select Mech Electronics Temperature

Comments:

Product Var Name i\_lbsmm\_t

Is element of: GLA03 Main Record

Short Description: Laser Beam Select Mechanism Mirror Temperature

Product Data Type: i4b

Total Bytes: 4

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 2000

Product Maximum: 6000

Description: Laser Beam Select Mechanism Mirror Temperature

Comments:

Product Var Name i\_HOP1ActH1\_c

Is element of: GLA03 Main Record

Short Description: HOP 1 Actuator Current - Heater 1

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 1 Actuator Current - Heater 1

Comments:

Product Var Name i\_HOP1ActH2\_c

Is element of: GLA03 Main Record

Short Description: HOP 1 Actuator Current - Heater 2

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 1 Actuator Current - Heater 2

Comments:

Product Var Name i\_HOP2ActH1\_c

Is element of: GLA03 Main Record

Short Description: HOP 2 Actuator Current - Heater 1

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 2 Actuator Current - Heater 1

Comments:

Product Var Name i\_HOP2ActH2\_c

Is element of: GLA03 Main Record

Short Description: HOP 2 Actuator Current - Heater 2

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 2 Actuator Current - Heater 2

Comments:

Product Var Name i\_HOP3ActH1\_c

Is element of: GLA03 Main Record

Short Description: HOP 3 Actuator Current - Heater 1

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 3 Actuator Current - Heater 1

Comments:

Product Var Name i\_HOP3ActH2\_c

Is element of: GLA03 Main Record

Short Description: HOP 3 Actuator Current - Heater 2

Product Data Type: i4b

Total Bytes: 4

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 800

Product Maximum: 1000

Description: HOP 3 Actuator Current - Heater 2

Comments:

Product Var Name iTsPMirHtrStPt

Is element of: GLA03 Main Record

Short Description: Telescope Primary Mirror Heater Temperature Setpoint

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 5000

Description: Telescope Primary Mirror Heater Temp Setpoint Readback

Comments:

Product Var Name iTsTwrHtrStPt

Is element of: GLA03 Main Record

Short Description: Telescope Tower Heater Temperature Setpoint

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 5000

Description: Telescope Tower Heater Temperature Setpoint Readback

Comments:

Product Var Name i\_EtHtr\_StPt

Is element of: GLA03 Main Record

Short Description: Etalon Heater Temperature Setpoint

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 5000

Description: Etalon Heater Temperature Setpoint Readback

Comments:

Product Var Name i\_LHP1\_StPt

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 1 Temperature Setpoint

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 5000

Description: Loop Heat Pipe 1 Temperature Setpoint Readback

Comments:

Product Var Name i\_LHP2\_StPt

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 2 Temperature Setpoint

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 5000

Description: Loop Heat Pipe 2 Temperature Setpoint Readback

Comments:



Product Var Name i\_TsPMirHtr\_St

Is element of: GLA03 Main Record

Short Description: Telescope Primary Mirror Heater Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Telescope Primary Mirror Heater Enable Readback. 0 = Disabled; 0xFF = Enabled.

Comments:

Product Var Name i\_TsTwrHtr\_St

Is element of: GLA03 Main Record

Short Description: Telescope Tower Heater Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Telescope Tower Heater Enable Readback. 0 = Disabled; 0xFF = Enabled.

Comments:

Product Var Name i\_EtHtr\_St

Is element of: GLA03 Main Record

Short Description: Etalon Heater Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Etalon Heater Enable Readback. 0 = Disabled; 0xFF = Enabled.

Comments:

Product Var Name i\_LHP1\_St

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 1 Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Loop Heat Pipe 1 Enable Readback. 0 = Disabled; 0xFF = Enabled.

Comments:

Product Var Name i\_LHP2\_St

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 2 Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Loop Heat Pipe 2 Enable Readback. 0 = Disabled; 0xFF = Enabled.

Comments:

Product Var Name i\_TsPMir\_sTh

Is element of: GLA03 Main Record

Short Description: Telescope Primary Mirror Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select - Telescope Primary Mirror - Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_TsSecSS\_sTh

Is element of: GLA03 Main Record

Short Description: Telescope Secondary Support Structure Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select Telescope Secondary Support Structure Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_TsSMir\_sTh

Is element of: GLA03 Main Record

Short Description: Telescope Secondary Mirror Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select - Telescope Secondary Mirror - Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_LHP1\_sTh

Is element of: GLA03 Main Record

Short Description: LHP1 Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select LHP1 (lasers) Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_LHP2\_sTh

Is element of: GLA03 Main Record

Short Description: LHP2 Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select LHP2 (rest of instrument) Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_Et\_sTh

Is element of: GLA03 Main Record

Short Description: Etalon Selected Thermistor

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Thermistor Select Etalon Status Readback. 0 = Thermistor 1; 0xFF = Thermistor 2.

Comments:

Product Var Name i\_tlm\_spare2

Is element of: GLA03 Main Record

Short Description: TLM Spare2

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_LHtP12\_St

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 1 & 2 Heater Status

Product Data Type: i1b

Total Bytes: 1

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Loop Heat Pipe 1 & 2 Heater Status; Pipe 1 -> Bit 0, LSB, Pipe 2 -> Bit 1; 0=OFF, 1=ON; spares -> Bits 2-7

Comments:

Product Var Name i\_spare23\_1

Is element of: GLA03 Main Record

Short Description: Spare23 1

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spares in telemetry packet. 3 1-byte spares: GHKSPARE1-GHKSPARE5.

Product Var Name i\_phdr\_50

Is element of: GLA03 Main Record

Short Description: Primary Header APID 50

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 50

Comments:

Product Var Name i\_shdr\_50

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 50 (time stamp)

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 50 (time stamp)

Comments:

Product Var Name i\_TsPMir\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Telescope Region 0 Primary Mirror Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Telescope Region 0 Primary Mirror

## Comments:

Product Var Name i\_TsSMir\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Telescope Region 1 Secondary Mirror Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Telescope Region 1 Secondary Mirror

## Comments:

Product Var Name i\_TsTwr\_t

Is element of: GLA03 Main Record

Short Description: Telescope Region 2 Tower Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Telescope Region 2 Tower

## Comments:

Product Var Name i\_EtC37d\_t

Is element of: GLA02 Record, GLA03 Main Record

Short Description: Etalon Temperature, Ch 37d

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Etalon Temperature, Ch 37d

Comments:

Product Var Name i\_LHP1C37e\_t

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 1 Temperature, Ch 37e

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Loop Heat Pipe 1 Temperature, Ch 37e

Comments:

Product Var Name i\_LHP2C37f\_t

Is element of: GLA03 Main Record

Short Description: Loop Heat Pipe 2 Temperature, Ch 37f

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Loop Heat Pipe 2 Temperature, Ch 37f

Comments:

Product Var Name i\_TsPMirHDr\_c

Is element of: GLA03 Main Record

Short Description: Telescope Primary Mirror Heater drive current

Product Data Type: i2b

Total Bytes: 2

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA



Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2500

Description: Telescope Primary Mirror Heater drive current

Comments:

Product Var Name i\_TsTwrHDr\_c

Is element of: GLA03 Main Record

Short Description: Telescope Tower Heater drive current

Product Data Type: i2b

Total Bytes: 2

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2500

Description: Telescope Tower Heater drive current

Comments:

Product Var Name i\_EtHtrC37j\_c

Is element of: GLA02 Record, GLA03 Main Record

Short Description: Etalon Heater Current, Ch 37j

Product Data Type: i2b

Total Bytes: 2

Product Units: Amps X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2500

Description: Etalon Heater Current, Ch 37j

Comments:

Product Var Name i\_DlyLineAll\_t

Is element of: GLA03 Main Record

Short Description: Delay Line All Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Delay Line All Temperature from Laser Monitor Board.

Comments:

Product Var Name i\_DlyLineMid\_t

Is element of: GLA03 Main Record

Short Description: Delay Line Mid Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Delay Line Mid Temperature from Laser Monitor Board.

Comments:

Product Var Name i\_DlyLineHi\_t

Is element of: GLA03 Main Record

Short Description: Delay Line Hi Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Delay Line Hi Temperature from Laser Monitor Board.

Comments:

Product Var Name i\_OTSL1\_rb

Is element of: GLA03 Main Record

Short Description: OTS Level1 readback

Product Data Type: i1b

Total Bytes: 1

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

Comments:

Product Var Name i\_OTSL2\_rb

Is element of: GLA03 Main Record

Short Description: OTS Level 2 readback

Product Data Type: i1b

Total Bytes: 1

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

Comments:

Product Var Name i\_OTSL3\_rb

Is element of: GLA03 Main Record

Short Description: OTS Level 3 readback

Product Data Type: i1b

Total Bytes: 1

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

Comments:

Product Var Name i\_OTSL4\_rb

Is element of: GLA03 Main Record

Short Description: OTS Level 4 readback

Product Data Type: i1b

Total Bytes: 1

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100

Description:

Comments:

Product Var Name i\_OTS\_tc1

Is element of: GLA03 Main Record

Short Description: OTS Trigger Count 1 readback

Product Data Type: i2b

Total Bytes: 2

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: The OTS trigger count 1 readback upper and lower byte. 1st item is the lower byte, 2nd item is the upper byte.

Comments:

Product Var Name i\_OTS\_tc2

Is element of: GLA03 Main Record

Short Description: OTS Trigger Count 2 readback

Product Data Type: i2b

Total Bytes: 2

Product Units: Counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 10000

Description: The OTS trigger count 2 readback upper and lower byte. 1st item is the lower byte, 2nd item is the upper byte.

Comments:

Product Var Name i\_tlm\_spare501

Is element of: GLA03 Main Record

Short Description: TLM Spare501

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_spare50

Is element of: GLA03 Main Record

Short Description: Spare 50

Product Data Type: i1b (21)

Total Bytes: 21

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Spares in telemetry packet. 29 1-byte spares: GHW5SPR[29].

Comments:

Product Var Name i\_phdr\_24

Is element of: GLA03 Main Record

Short Description: Primary Header APID 24

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 23

Comments:

Product Var Name i\_shdr\_24

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 24 (time stamp)

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 23 (time stamp)

Comments:

Product Var Name iHS\_CmdProc

Is element of: GLA03 Main Record

Short Description: HS Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: HS Task Cmd Processed Counter

Comments:

Product Var Name iHS\_CmdRej

Is element of: GLA03 Main Record

Short Description: HS Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: HS Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iCS\_CmdProc

Is element of: GLA03 Main Record

Short Description: CS Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CS Task Cmd Processed Counter

Comments:

Product Var Name iCS\_CmdRej

Is element of: GLA03 Main Record

Short Description: CS Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CS Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iTC\_CmdProc

Is element of: GLA03 Main Record

Short Description: TC Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: TC Task Cmd Processed Counter

Comments:

Product Var Name iTC\_CmdRej

Is element of: GLA03 Main Record

Short Description: TC Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: TC Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iSB\_CmdProc

Is element of: GLA03 Main Record

Short Description: SB Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB Task Cmd Processed Counter

Comments:

Product Var Name iSB\_CmdRej

Is element of: GLA03 Main Record

Short Description: SB Task Cmd Rejected (or Error) Counter



Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iSM\_CmdProc

Is element of: GLA03 Main Record

Short Description: SM Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM Task Cmd Processed Counter

Comments:

Product Var Name iSM\_CmdRej

Is element of: GLA03 Main Record

Short Description: SM Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iRT\_CmdProc

Is element of: GLA03 Main Record

Short Description: RT Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT Task Cmd Processed Counter

Comments:

Product Var Name iRT\_CmdRej

Is element of: GLA03 Main Record

Short Description: RT Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iRT\_RCH3CmdRcv

Is element of: GLA03 Main Record

Short Description: RT Task RCH3 Commands Received

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT Task RCH3 (SA22-25, CSA 26) Commands Received. Does not count spacecraft position and command packet.

Comments:

Product Var Name iRT\_RCH3CmdRej

Is element of: GLA03 Main Record

Short Description: RT Task RCH3 Commands Rejected

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT Task RCH3 (SA22-25, CSA 26) Commands Rejected. Commands are rejected for checksum problems.

Comments:

Product Var Name iMD\_CmdProc

Is element of: GLA03 Main Record

Short Description: MD Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: MD Task Cmd Processed Counter

Comments:

Product Var Name iMD\_CmdRej

Is element of: GLA03 Main Record

Short Description: MD Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: MD Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iAD\_CmdProc

Is element of: GLA03 Main Record

Short Description: AD Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: AD Task Cmd Processed Counter

Comments:

Product Var Name iAD\_CmdRej

Is element of: GLA03 Main Record

Short Description: AD Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: AD Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iAD\_StatFlag

Is element of: GLA03 Main Record

Short Description: AD Target Status and Mode Flags

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: AD Target Status and Mode Flags. 0 = Not present; 1 = Present.

Comments:

Product Var Name i\_tlm\_spare24

Is element of: GLA03 Main Record

Short Description: TLM Spare24

Product Data Type: i1b (3, 4)

Total Bytes: 12

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iCD\_CCDDProc

Is element of: GLA03 Main Record

Short Description: CD Task CCD Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: CD Task CCD Processed Counter

Comments:

Product Var Name iCD\_CCDDRej

Is element of: GLA03 Main Record

Short Description: CD Task CCD Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 128

Description: CD Task CCD Rejected (or Error) Counter

Comments:

Product Var Name iCD\_StatusFlag

Is element of: GLA03 Main Record

Short Description: CD Status Flags

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: CD Status Flags. Bits 0-2 indicate CD Mode; 1 = Idle, 2=Engineering, 4=Science, Other values invalid. Bits 3 indicates CD Data Ready Interrupt; 0=Enabled, 1=Disabled. Bits 4 - 5 indicate CD Idle Mode Interrupt Source; 0=Clear Mem, 1=Fire Cmd, 2=Fire Ack, Other values invalid. Bit 6 indicates CD Range Gate Offset Source; 0=Fire Ack, 1= Fire Cmd. Bit 7 is spare.

Comments:

Product Var Name iDC\_CmdProc

Is element of: GLA03 Main Record

Short Description: DC Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: DC Task Cmd Processed Counter

Comments:

Product Var Name iDC\_CmdRej

Is element of: GLA03 Main Record

Short Description: DC Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: DC Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iDC\_StatFlag

Is element of: GLA03 Main Record

Short Description: DC Status Flags

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32768

Description: DC Status Flags

Comments:

Product Var Name iGP\_CmdProc

Is element of: GLA03 Main Record

Short Description: GP Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: GP Task Cmd Processed Counter

Comments:

Product Var Name iGP\_CmdRej

Is element of: GLA03 Main Record

Short Description: GP Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: GP Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iGP\_StatFlag

Is element of: GLA03 Main Record

Short Description: GP Status Flags

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32768

Description: GP Status Flags

Comments:

Product Var Name iPC\_CmdProc

Is element of: GLA03 Main Record

Short Description: PC Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: PC Task Cmd Processed Counter

Comments:



Product Var Name iPC\_CmdRej

Is element of: GLA03 Main Record

Short Description: PC Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: PC Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iPC\_StatFlag

Is element of: GLA03 Main Record

Short Description: PC Status Flags

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: PC Status Flags

Comments:

Product Var Name iCT\_CmdProc

Is element of: GLA03 Main Record

Short Description: CT Task Cmd Processed Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Task Cmd Processed Counter

Comments:

Product Var Name iCT\_CmdRej

Is element of: GLA03 Main Record

Short Description: CT Task Cmd Rejected (or Error) Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Task Cmd Rejected (or Error) Counter

Comments:

Product Var Name iCT\_Mode

Is element of: GLA03 Main Record

Short Description: CT Task Mode

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CT Task mode. Bit 0 indicates CT Task Software Mode; 0=Manual, 1=Auto. Bit 1 indicates CT Task C&T Control Hardware Mode, Register bit; 0=Manual, 1=Auto. Bit 2 indicates CT Task Startup Mode, Discrete cmd; 0=Manual, 1=Auto Power Up Osc/AD. Bit 3 indicates CT Task Startup AD/OSC, Discrete cmd; 0=Primary, 1=Secondary. Bits 4 - 5 indicate CT Etalon Tracking Mode; 0=Off, 1=Acquire, 2=Tracking, 3=Invalid. Bits 6 - 7 are spares.

Comments:

Product Var Name i\_phdr\_25

Is element of: GLA03 Main Record

Short Description: Primary Header APID 25

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 25

Comments:

Product Var Name i\_shdr\_25

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 25 (time stamp)

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 25 (time stamp)

Comments:

Product Var Name i\_HS\_PrevMode

Is element of: GLA03 Main Record

Short Description: HS Processor Previous Mode

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: HS Processor Previous Mode; 0=Unknown, 2=PROM, 3=EEPROM

Comments:

Product Var Name i\_HS\_CurMode

Is element of: GLA03 Main Record

Short Description: HS Processor Current Mode

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: HS Processor Current Mode; 0=Unknown, 2=PROM, 3=EEPROM

Comments:

Product Var Name i\_SubSysPres

Is element of: GLA03 Main Record

Short Description: Subsystem Present Flags

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Subsystem Present Bit Flags. Value of 0 = subsystem not present; value of 1 = subsystem present in small and large telemetry packets. Bit 0 = HS; Bit 1 = CS; Bit 2 = TC; Bit 3 = SB; Bit 4 = SM; Bit 5 = RT; Bit 6 = AD; Bit 7 = MD; Bit 8 = CD; Bit 9 = DC; Bit 10 = GP; Bit 11 = PC; Bit 12 = CT. Bits 13-15 are spares.

Comments:

Product Var Name iHS\_WarmRCt

Is element of: GLA03 Main Record

Short Description: HS Warm Restart Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS Warm Restart Count

Comments:

Product Var Name iHS\_ColdRCt

Is element of: GLA03 Main Record

Short Description: HS Cold Restart Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS Cold Restart Count

Comments:

Product Var Name iHS\_MxWarmRCt

Is element of: GLA03 Main Record

Short Description: HS Max Warm Restart Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS Max Warm Restart Count

Comments:

Product Var Name iHS\_ColdWarmF

Is element of: GLA03 Main Record

Short Description: HS Cold-Warm Flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: HS Cold-Warm Flag

Comments:

Product Var Name iHS\_OSResetF

Is element of: GLA03 Main Record

Short Description: HS OS Caused Reset Flag

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: HS OS Caused Reset Flag

Comments:

Product Var Name iHS\_OSTickCt

Is element of: GLA03 Main Record

Short Description: HS OS Tick Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS OS Tick Count

Comments:

Product Var Name iHS\_HSExecCt

Is element of: GLA03 Main Record

Short Description: HS HS Exec Count

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: HS HS Exec Count

## Comments:

Product Var Name iHS\_CSExecCt

Is element of: GLA03 Main Record

Short Description: HS CS Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS CS Exec Count

Comments:

Product Var Name iHS\_TCExecCt

Is element of: GLA03 Main Record

Short Description: HS TC Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS TC Exec Count

Comments:

Product Var Name iHS\_SBExecCt

Is element of: GLA03 Main Record

Short Description: HS SB Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS SB Exec Count

Comments:

Product Var Name iHS\_SMExecCt

Is element of: GLA03 Main Record

Short Description: HS SM Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS SM Exec Count

Comments:

Product Var Name iHS\_RTExecCt

Is element of: GLA03 Main Record

Short Description: HS RT Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS RT Exec Count

Comments:

Product Var Name iHS\_MDExecCt

Is element of: GLA03 Main Record

Short Description: HS MD Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA



Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS MD Exec Count

Comments:

Product Var Name iHS\_ADExecCt

Is element of: GLA03 Main Record

Short Description: HS AD Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS AD Exec Count

Comments:

Product Var Name iHS\_CDExecCt

Is element of: GLA03 Main Record

Short Description: HS CD Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS CD Exec Count

Comments:

Product Var Name iHS\_DCExecCt

Is element of: GLA03 Main Record

Short Description: HS DC Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS DC Exec Count

Comments:

Product Var Name iHS\_GPExecCt

Is element of: GLA03 Main Record

Short Description: HS GP Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS GP Exec Count

Comments:

Product Var Name iHS\_PCExecCt

Is element of: GLA03 Main Record

Short Description: HS PC Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS PC Exec Count

Comments:

Product Var Name iHS\_CTExecCt

Is element of: GLA03 Main Record

Short Description: HS CT Exec Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS CT Exec Count

Comments:

Product Var Name iHSFPU\_Uflw\_Ct

Is element of: GLA03 Main Record

Short Description: HS FPU Underflow Count

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: HS FPU Underflow Count

Comments:

Product Var Name iHS\_spare1

Is element of: GLA03 Main Record

Short Description: HS spare 1

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spares.

Product Var Name iHS\_spare2

Is element of: GLA03 Main Record

Short Description: HS Spare 2

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spares.

Product Var Name iHSTCfireISRCt

Is element of: GLA03 Main Record

Short Description: HS TC Fire Cmd ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS TC Fire Cmd ISR Count

Comments:

Product Var Name iHS\_RTISRCtLo

Is element of: GLA03 Main Record

Short Description: HS RT ISR Count - Low Priority

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS RT ISR Count - Low Priority

Comments:

Product Var Name iHS\_spare3

Is element of: GLA03 Main Record

Short Description: HS Spare 3

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spares.

Product Var Name iHS\_CTISRCt

Is element of: GLA03 Main Record

Short Description: HS CT ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS CT ISR Count

Comments:

Product Var Name iHS\_spare4

Is element of: GLA03 Main Record

Short Description: HS Spare 4

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spare.

Product Var Name iHS\_spare5

Is element of: GLA03 Main Record

Short Description: HS Spare 5

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spare.

Product Var Name iHS\_ppsISRCt

Is element of: GLA03 Main Record

Short Description: HS GPS 10 Sec ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS GPS 10 Sec ISR Count

Comments:

Product Var Name iHS\_DC\_ISRCt

Is element of: GLA03 Main Record

Short Description: HS DC ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS DC ISR Count

Comments:

Product Var Name iHS\_PC\_ISRc

Is element of: GLA03 Main Record

Short Description: HS PC ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS PC ISR Count

Comments:

Product Var Name iHS\_CD\_ISRc

Is element of: GLA03 Main Record

Short Description: HS CD ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS CD ISR Count

Comments:

Product Var Name iHS\_AD\_ISRc

Is element of: GLA03 Main Record

Short Description: HS AD ISR Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS AD ISR Count

Comments:

Product Var Name iHS\_spare6

Is element of: GLA03 Main Record

Short Description: HS Spare 6

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: HS spare.

Product Var Name iHS\_OSEventSeq

Is element of: GLA03 Main Record

Short Description: HS OS Event Seq Number

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: HS OS Event Seq Number

Comments:

Product Var Name iHS\_PeakCPU

Is element of: GLA03 Main Record

Short Description: HS Peak CPU Utilization

Product Data Type: i1b (4)



Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: HS Peak CPU Utilization

Comments:

Product Var Name iHS\_LastCPU

Is element of: GLA03 Main Record

Short Description: HS Last CPU Utilization

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: HS Last CPU Utilization

Comments:

Product Var Name iHSPCI\_Bus\_st

Is element of: GLA03 Main Record

Short Description: HS OS PCI Bus Target Enable and Interrupt status

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: HS OS PCI Bus Target Enable and Interrupt status

Comments:

Product Var Name iHSOS\_Plog\_st

Is element of: GLA03 Main Record

Short Description: HS OS Performance Log Enable Flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: HS OS Performance Log Enable Flag

Comments:

Product Var Name iHSOS\_Plog\_ct

Is element of: GLA03 Main Record

Short Description: HS OS Performance Log Item Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: HS OS Performance Log Item Count

Comments:

Product Var Name iHS\_Plog\_stAdd

Is element of: GLA03 Main Record

Short Description: HS OS Performance Log Filter Start Address

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: HS OS Performance Log Filter Start Address

Comments:

Product Var Name iHS\_Plog\_mask

Is element of: GLA03 Main Record

Short Description: HS OS Performance Log Filter Mask

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32000

Description: HS OS Performance Log Filter Mask

Comments:

Product Var Name i\_spare25\_2

Is element of: GLA03 Main Record

Short Description: Spare25 2

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iCS\_StatFlag

Is element of: GLA03 Main Record

Short Description: CS Status Flags

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: CS Status Flags. Bits 0-1 indicate CS Enable/Disabled Status; value of 0=Disabled, 1=Enabled. Bits 2-3 indicate CS Code Memory Checksum Status; value of 0=Disabled, 1=Enabled, 2=Disabled and Recomputing, 3=Enabled and Recomputing. Bits 4-5 indicate CS Table Memory Checksum Status; value of 0=Disabled, 1=Enabled, 2=Disabled and Recomputing, 3=Enabled and Recomputing. Bits 6-7 indicate CS EEPROM Checksum status; value of 0=Disabled, 1=Enabled, 2=Disabled and Recomputing, 3=Enabled and Recomputing.

Comments:

Product Var Name iCS\_codeErr\_ct

Is element of: GLA03 Main Record

Short Description: CS Code Segment Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CS Code Segment Error Count

Comments:

Product Var Name iCSEPMerr\_ct

Is element of: GLA03 Main Record

Short Description: CS EEPROM Segment Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CS EEPROM Segment Error Count

Comments:

Product Var Name iCSTblRamerr\_ct

Is element of: GLA03 Main Record

Short Description: CS Table Ram Segment Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CS Table Ram Segment Error Count

Comments:

Product Var Name iCS\_codeErr\_ID

Is element of: GLA03 Main Record

Short Description: CS Table ID of last Code Error

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Table ID of last Code Error

Comments:

Product Var Name iCSEPMerr\_ID

Is element of: GLA03 Main Record

Short Description: CS Table ID of last EEPROM Error

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Table ID of last EEPROM Error

Comments:

Product Var Name iCSTblRamErrID

Is element of: GLA03 Main Record

Short Description: CS Table ID of last Table RAM Error

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Table ID of last Table RAM Error

Comments:

Product Var Name iCS\_code\_mstrcs

Is element of: GLA03 Main Record

Short Description: CS Code Segment Master Checksum

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Code Segment Master Checksum

Comments:

Product Var Name iCSRam\_mstrcs

Is element of: GLA03 Main Record

Short Description: CS Table RAM Master Checksum

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Table RAM Master Checksum

Comments:

Product Var Name iCSEPROMmstrcs

Is element of: GLA03 Main Record

Short Description: CS EEPROM Master Checksum

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS EEPROM Master Checksum

Comments:

Product Var Name iEPROM\_bmem\_cs

Is element of: GLA03 Main Record

Short Description: CS Checksum of EEPROM Boot Memory

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Checksum of EEPROM Boot Memory

Comments:

Product Var Name iEPROM\_mem\_cs

Is element of: GLA03 Main Record

Short Description: CS Checksum of EEPROM Memory

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Checksum of EEPROM Memory

Comments:

Product Var Name iPROM\_mem\_cs

Is element of: GLA03 Main Record

Short Description: CS Checksum of PROM Memory

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CS Checksum of PROM Memory

Comments:

Product Var Name iCS\_spare

Is element of: GLA03 Main Record

Short Description: CS Spare

Product Data Type: i1b (18, 4)

Total Bytes: 72

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: CS Spare - 18 bytes.

Product Var Name iTC\_MET\_u2

Is element of: GLA03 Main Record

Short Description: TC GLAS MET Upper 2 bytes

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: TC GLAS MET Upper 2 bytes

Comments:



Product Var Name iTC\_MET\_I4

Is element of: GLA03 Main Record

Short Description: TC GLAS MET Lower 4 bytes

Product Data Type: i1b (4, 4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: TC GLAS MET Lower 4 bytes

Comments:

Product Var Name iTC\_FcmdInc\_u2

Is element of: GLA03 Main Record

Short Description: TC Fire Command Time Increment Upper 2 bytes

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: TC Fire Command Time Increment Upper 2 bytes

Comments:

Product Var Name iTC\_FcmdInc\_I4

Is element of: GLA03 Main Record

Short Description: TC Fire Command Time Increment Lower 4 bytes

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 157680000

Description: TC Fire Command Time Increment Lower 4 bytes

Comments:

Product Var Name iTCworkMET\_sec

Is element of: GLA03 Main Record

Short Description: TC GLAS MET Working Time seconds

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 157680000

Description: TC GLAS MET Working Time seconds

Comments:

Product Var Name iTCworkMET\_us

Is element of: GLA03 Main Record

Short Description: TC GLAS MET Working Time microseconds

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: TC GLAS MET Working Time micro-seconds

Comments:

Product Var Name i\_spare25\_3

Is element of: GLA03 Main Record

Short Description: Spare25 3

Product Data Type: i1b (18, 4)

Total Bytes: 72

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare 25 3

Product Var Name i\_SB\_SndErrCnt

Is element of: GLA03 Main Record

Short Description: SB Send Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB Send Error Count

Comments:

Product Var Name i\_SB\_RcvErrCnt

Is element of: GLA03 Main Record

Short Description: SB Receive Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB Receive Error Count

Comments:

Product Var Name i\_SB\_OSErrCnt

Is element of: GLA03 Main Record

Short Description: SB OS Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB OS Error Count

Comments:

Product Var Name iSB\_QFullErrCt

Is element of: GLA03 Main Record

Short Description: SB Queue Full Error Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SB Queue Full Error Count

Comments:

Product Var Name iSB\_BOverErrCt

Is element of: GLA03 Main Record

Short Description: SB Buffer overrun Error Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB Buffer overrun Error Count

Comments:

Product Var Name i\_SB\_LBO\_Strm

Is element of: GLA03 Main Record

Short Description: SB last buffer overrun - Stream Id

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last buffer overrun - Stream Id

Comments:

Product Var Name i\_SB\_LBO\_Pipe

Is element of: GLA03 Main Record

Short Description: SB last buffer overrun - Pipeline Id

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last buffer overrun - Pipeline Id

Comments:

Product Var Name i\_SB\_LBO\_Task

Is element of: GLA03 Main Record

Short Description: SB last buffer overrun - Sender Task ID

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last buffer overrun - Sender Task ID

Comments:

Product Var Name i\_SB\_LQF\_Strm

Is element of: GLA03 Main Record

Short Description: SB last queue full - Stream Id

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last queue full - Stream Id

Comments:

Product Var Name i\_SB\_LQF\_Pipe

Is element of: GLA03 Main Record

Short Description: SB last queue full - Pipeline Id

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last queue full - Pipeline Id

Comments:

Product Var Name i\_SB\_LQF\_Task

Is element of: GLA03 Main Record

Short Description: SB last queue full - Sender Task ID

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SB last queue full - Sender Task ID

Comments:

Product Var Name i\_SB\_Spare

Is element of: GLA03 Main Record

Short Description: SB Spare

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: SB Spare

Product Var Name iSMRemDumpCopy

Is element of: GLA03 Main Record

Short Description: SM num of remaining copies to be dumped

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM num of remaining copies to be dumped

Comments:

Product Var Name iSM\_Dump\_flag

Is element of: GLA03 Main Record

Short Description: SM dump in progress flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: SM tbl/mem dump in progress flag. Value of 0 = false, 1 = true.

Comments:

Product Var Name iSM\_TblOps\_fg

Is element of: GLA03 Main Record

Short Description: SM table operations flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM table operations flag. Bits 0 - 5 indicate SM Table Session Type; value of 0=None, 5=DUMP\_ONLY, 6=REP\_EEPROM, 7=REP\_RAM, 8=APPD\_ACTV. Bit 6 indicates table operations; value of 0 = Inactive, 1 = Active. Bit 7 is spare.

Comments:

Product Var Name iSM\_TOp\_ImgTyp

Is element of: GLA03 Main Record

Short Description: SM table operations from image type

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: SM table operations from image type. Value of 0=None, 1=EEPROM, 2=RAM, 3=NULL.

Comments:

Product Var Name iSM\_TblID\_sel

Is element of: GLA03 Main Record

Short Description: SM table id selected

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0



Product Maximum: 32768

Description: SM table id selected

Comments:

Product Var Name iSM\_TblSize

Is element of: GLA03 Main Record

Short Description: SM currently selected table size in words

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SM currently selected tbl size in words

Comments:

Product Var Name iSM\_TblCksum

Is element of: GLA03 Main Record

Short Description: SM currently selected table checksum

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: SM currently selected table checksum

Comments:

Product Var Name iSM\_success\_ct

Is element of: GLA03 Main Record

Short Description: SM table commit success count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM table commit success count

Comments:

Product Var Name iSM\_fail\_ct

Is element of: GLA03 Main Record

Short Description: SM table commit failure count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM table commit failure count

Comments:

Product Var Name iSM\_TblWdLd\_ct

Is element of: GLA03 Main Record

Short Description: SM table num. of words loaded

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: SM table num. of words loaded

Comments:

Product Var Name iSM\_FSW\_BldNum

Is element of: GLA03 Main Record

Short Description: SM FSW build number

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM FSW build number

Comments:

Product Var Name iSM\_FSW\_VerNum

Is element of: GLA03 Main Record

Short Description: SM FSW version number

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: SM FSW version number

Comments:

Product Var Name iSM\_Spares

Is element of: GLA03 Main Record

Short Description: SM spares

Product Data Type: i1b (10, 4)

Total Bytes: 40

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: SM Spare

Product Var Name iBCRT\_CntrlRWd

Is element of: GLA03 Main Record

Short Description: BCRT CONTROL REGISTER WORD

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 384

Description: BCRT CONTROL REGISTER WORD. Bit 7 indicates RT Channel A Select; value of 0 = off, 1 = on. Bit 8 indicates RT Channel B Select; value of 0 = off, 1 = on. All other bits are unused.

Comments:

Product Var Name iBCRT\_StatReg

Is element of: GLA03 Main Record

Short Description: BCRT Status Register

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: BCRT Status Register. Bit 0 indicates RT Status, RT Mode Enabled Flag; value of 0 = Disabled, 1 = Enabled. All other bits are unused.

Comments:

Product Var Name iBCRT\_IntStReg

Is element of: GLA03 Main Record

Short Description: BCRT INTERRUPT STATUS REGISTER

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BCRT INTERRUPT STATUS REGISTER

Comments:

Product Var Name iRT\_MsgErr

Is element of: GLA03 Main Record

Short Description: RT 1553 MESSAGE ERRORS

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT 1553 MESSAGE ERRORS

Comments:

Product Var Name iRT\_RtryCt

Is element of: GLA03 Main Record

Short Description: RT 1553 RETRY COUNT

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT 1553 RETRY COUNT

Comments:

Product Var Name iRT\_InvCmd

Is element of: GLA03 Main Record

Short Description: RT 1553 INVALID COMMANDS

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT 1553 INVALID COMMANDS

Comments:

Product Var Name iRT\_InvBCCmd

Is element of: GLA03 Main Record

Short Description: RT 1553 INVALID BROADCAST CMDS

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT 1553 INVALID BROADCAST CMDS

Comments:

Product Var Name iRT\_ModeCodeCt

Is element of: GLA03 Main Record

Short Description: RT MODE CODES RECEIVED

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: RT MODE CODES RECEIVED

Comments:

Product Var Name i\_spare25\_4

Is element of: GLA03 Main Record

Short Description: Spare25 4

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iRT\_RcvRCH1\_ct

Is element of: GLA03 Main Record

Short Description: RT PACKETS RECEIVED ON RCH1

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT PACKETS RECEIVED ON RCH1

Comments:

Product Var Name iRT\_RejRCH1\_ct

Is element of: GLA03 Main Record

Short Description: RT PACKETS Rejected ON RCH1

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT PACKETS Rejected ON RCH1

Comments:

Product Var Name iRT\_SentXCH1ct

Is element of: GLA03 Main Record

Short Description: RT PACKETS SENT ON XCH1

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT PACKETS SENT ON XCH1; HK channel.

Comments:

Product Var Name iRT\_SentXCH2ct

Is element of: GLA03 Main Record

Short Description: RT PACKETS SENT ON XCH2

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT PACKETS SENT ON XCH2; Diagnostic channel.

Comments:

Product Var Name iRT\_CmdHist\_ct

Is element of: GLA03 Main Record

Short Description: RT Number of Command History Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: RT Number of Command History Packets Sent

Comments:

Product Var Name iRT\_cksum\_st

Is element of: GLA03 Main Record

Short Description: RT Checksum Status

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg



Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: RT Checksum Status. Value of 0 = CMD Checksum Disabled; 1 = CMD Checksum enabled.

Comments:

Product Var Name i\_spare25\_5

Is element of: GLA03 Main Record

Short Description: Spare25 5

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iMD\_Tbl\_flg

Is element of: GLA03 Main Record

Short Description: MD Table Enable Flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iMD\_spare

Is element of: GLA03 Main Record

Short Description: MD spare

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: MD spare

Product Var Name iMD\_T1addct

Is element of: GLA03 Main Record

Short Description: MD Table #1 Address Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iMD\_T2addct

Is element of: GLA03 Main Record

Short Description: MD Table #2 Address Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iMD\_T1rate

Is element of: GLA03 Main Record

Short Description: MD Table #1 Rate

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iMD\_T2rate

Is element of: GLA03 Main Record

Short Description: MD Table #2 Rate

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iMD\_spare2

Is element of: GLA03 Main Record

Short Description: MD Spare 2

Product Data Type: i1b (12, 4)

Total Bytes: 48

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: MD spare

Product Var Name i\_phdr\_55

Is element of: GLA03 Main Record

Short Description: Primary Header APID 55

Product Data Type: i1b (6, 4)

Total Bytes: 24

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 55

Comments:

Product Var Name i\_shdr\_55

Is element of: GLA03 Main Record

Short Description: Secondary Header 55 (time stamp)

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header for APID 55 (time stamp)

Comments:

Product Var Name iAD\_SWErr\_ct

Is element of: GLA03 Main Record

Short Description: AD Software Error Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Software Error Count. Number of software errors detected.

Comments:

Product Var Name iAD\_HWErr\_ct

Is element of: GLA03 Main Record

Short Description: AD Hardware Error Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Hardware Error Count. Number of hardware errors detected.

Comments:

Product Var Name iAD\_Shot\_ct

Is element of: GLA03 Main Record

Short Description: AD Shot Count Value

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: AD Shot Count Value

Comments:

Product Var Name iAD\_ShotCtSkip

Is element of: GLA03 Main Record

Short Description: AD Shot Count Skip Detected

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: AD Shot Count Skip Detected flag; 0 = no skip, 1 = skip.

Comments:

Product Var Name iAD\_Sync\_flag

Is element of: GLA03 Main Record

Short Description: AD Synchronized Flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: AD Synchronized Flag; 0 = not in sync, 1 = in sync.

Comments:

Product Var Name iAD\_spare1

Is element of: GLA03 Main Record

Short Description: AD Spare 1

Product Data Type: i1b (5, 4)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iAD\_DSPfire\_ct

Is element of: GLA03 Main Record

Short Description: AD DSP Laser Fire Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Laser Fire Count. Indicates the number of laser fire commands detected.

Comments:

Product Var Name iADDSPalive\_ct

Is element of: GLA03 Main Record

Short Description: AD DSP Alive Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Alive Count. Increments once every 75ms when laser fire command fails.

Comments:

Product Var Name iAD\_AncPkt\_ct

Is element of: GLA03 Main Record

Short Description: AD Ancillary Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Ancillary Packets Sent

Comments:

Product Var Name iAD\_EngPkt\_ct

Is element of: GLA03 Main Record

Short Description: AD Engineering Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Engineering Packets Sent

Comments:

Product Var Name iAD\_SmSci\_ct

Is element of: GLA03 Main Record

Short Description: AD Science Small Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Science Small Packets Sent

Comments:

Product Var Name iAD\_LgSci\_ct

Is element of: GLA03 Main Record

Short Description: AD Science Large Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Science Large Packets Sent

Comments:

Product Var Name iDSPLoadProcCt

Is element of: GLA03 Main Record

Short Description: AD DSP Load Packets Processed Count

Product Data Type: i2b (4)

Total Bytes: 8



Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Load Packets Processed Count

Comments:

Product Var Name iDSPMDump\_ct

Is element of: GLA03 Main Record

Short Description: AD DSP Memory Dump Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Memory Dump Packets Sent

Comments:

Product Var Name iADMLoadCmdErr

Is element of: GLA03 Main Record

Short Description: AD Memory Load Command Errors

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Memory Load Command Errors

Comments:

Product Var Name iADMDumpCmdErr

Is element of: GLA03 Main Record

Short Description: AD Memory Dump Command Errors

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD Memory Dump Command Errors

Comments:

Product Var Name iDSPcksumRate

Is element of: GLA03 Main Record

Short Description: AD DSP Checksum Rate

Product Data Type: i2b ( 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Checksum Rate. Number of 48-bit words checked in each of 3 memory types of DSP memory each shot (40 Hz).

Comments:

Product Var Name iDSPcksumSW\_st

Is element of: GLA03 Main Record

Short Description: AD DSP Checksum S/W Enable Status

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: AD DSP Checksum S/W Enable Status; 0 = Disable, 1 = Enable.

Comments:

Product Var Name iDSP\_cksum\_ct

Is element of: GLA03 Main Record

Short Description: AD DSP # of times all of memory has been checksummed

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP # of times all of memory has been checksummed

Comments:

Product Var Name iDSP\_BScksum\_I

Is element of: GLA03 Main Record

Short Description: AD DSP Bootstrap Checksum Lower 16 bits

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP Bootstrap Checksum Lower 16 bits

Comments:

Product Var Name iDSPEPROMcs\_I

Is element of: GLA03 Main Record

Short Description: AD DSP EPROM Checksum Lower 16 bits

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP EPROM Checksum Lower 16 bits

Comments:

Product Var Name iDSPRAMcksum\_l

Is element of: GLA03 Main Record

Short Description: AD DSP RAM Checksum Lower 16 bits

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD DSP RAM Checksum Lower 16 bits

Comments:

Product Var Name iDSP\_BScksum\_u

Is element of: GLA03 Main Record

Short Description: AD DSP Bootstrap Checksum Upper 32 bits

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: AD DSP Bootstrap Checksum Upper 32 bits

Comments:

Product Var Name iDSPEPROMcs\_u

Is element of: GLA03 Main Record

Short Description: AD DSP EPROM Checksum Upper 32 bits

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: AD DSP EPROM Checksum Upper 32 bits

Comments:

Product Var Name iDSPRAMcksum\_u

Is element of: GLA03 Main Record

Short Description: AD DSP RAM Checksum Upper 32 bits

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: AD DSP RAM Checksum Upper 32 bits

Comments:

Product Var Name iAD\_DSPsw\_bnum

Is element of: GLA03 Main Record

Short Description: AD DSP S/W Build Number

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: AD DSP S/W Build Number

Comments:

Product Var Name iAD\_DSPsw\_vnum

Is element of: GLA03 Main Record

Short Description: AD DSP S/W Version Number

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: AD DSP S/W Version Number

Comments:

Product Var Name iAD\_GPsrwin\_ct

Is element of: GLA03 Main Record

Short Description: AD GPS Range Window Packets received

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: AD GPS Range Window Packets received

Comments:

Product Var Name iDSP\_Pcksuml

Is element of: GLA03 Main Record

Short Description: AS DSP Patch Checksum Bits 15..0

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iDSP\_Pcksumu

Is element of: GLA03 Main Record

Short Description: AS DSP Patch Checksum bits 47..16

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description:

Comments:

Product Var Name iDSP\_autoreset

Is element of: GLA03 Main Record

Short Description: AD Auto Reset DSP Flag

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iAD\_SWenable

Is element of: GLA03 Main Record

Short Description: AD Software Enable Flags

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iAD\_DSPtroub

Is element of: GLA03 Main Record

Short Description: AD DSP Trouble Indicator Status Word

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iADmemTLoaderr

Is element of: GLA03 Main Record

Short Description: AD DSP Memory Table Load Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iAD\_FixGain

Is element of: GLA03 Main Record

Short Description: AD Fixed Return Gain Setting

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description:

Comments:

Product Var Name iAD\_spare2

Is element of: GLA03 Main Record

Short Description: AD Spare 2



Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name iCD\_Swerr\_ct

Is element of: GLA03 Main Record

Short Description: CD Software Error Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Software Error Count

Comments:

Product Var Name iCD\_shot\_ct

Is element of: GLA03 Main Record

Short Description: CD Shot Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Shot Count

Comments:

Product Var Name iCD\_SciPkt\_ct

Is element of: GLA03 Main Record

Short Description: CD Science Mode Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Science Mode Packets Sent

Comments:

Product Var Name iCD\_EngPkt\_ct

Is element of: GLA03 Main Record

Short Description: CD Engineering Mode Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Engineering Mode Packets Sent

Comments:

Product Var Name iCD\_AncPkt\_ct

Is element of: GLA03 Main Record

Short Description: CD Ancillary Packet Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Ancillary Packet Sent

Comments:

Product Var Name iCDRGateRcv\_ct

Is element of: GLA03 Main Record

Short Description: CD Range Gate Pkts Received

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Range Gate Pkts Received

Comments:

Product Var Name iCD40ctrPkt\_ct

Is element of: GLA03 Main Record

Short Description: CD 40-bit Counter Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD 40-bit Counter Packets Sent

Comments:

Product Var Name i\_spare55\_1

Is element of: GLA03 Main Record

Short Description: Spare 55\_1

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Spare in telemetry.

Comments:

Product Var Name iCD\_BG1delay

Is element of: GLA03 Main Record

Short Description: CD Background #1 Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Background #1 Delay

Comments:

Product Var Name iCD\_BG2delay

Is element of: GLA03 Main Record

Short Description: CD Background #2 Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Background #2 Delay

Comments:

Product Var Name iCD\_Rgatedelay

Is element of: GLA03 Main Record

Short Description: CD Range Gate Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: CD Range Gate Delay

Comments:

Product Var Name i\_spare55\_2

Is element of: GLA03 Main Record

Short Description: Spare 55\_2

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Spare in telemetry.

Comments:

Product Var Name iCD\_rawADout

Is element of: GLA03 Main Record

Short Description: CD Raw A/D Output Data Structure

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: CD Raw A/D Output Data Structure. Bits 0 - 7 are the raw Cloud digitizer A/D output data. Bit 8 is the CD Raw A/D Overflow Flag. Bits 9 - 13 indicate the CD Attenuation Setting; value of 1=1/1, 2=1/1.77, 4=1/3.16, 8=1/5.6, 16=1/10. All other bits are unused.

Comments:

Product Var Name iCD\_GPSLch\_32l

Is element of: GLA03 Main Record

Short Description: CD GPS 40 bit Latch Value 32 lsb

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: CD GPS 40 bit Latch Value 32 lsb

Comments:

Product Var Name iCDfackLch\_32l

Is element of: GLA03 Main Record

Short Description: CD Fire Acknowledge 40 bit Latch Value 32 lsb

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: CD Fire Acknowledge 40 bit Latch Value 32 lsb

Comments:

Product Var Name iCDfcmDLch\_32l

Is element of: GLA03 Main Record

Short Description: CD Fire Cmd 40 bit Latch Value 32 lsb

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: CD Fire Cmd 40 bit Latch Value 32 lsb

Comments:

Product Var Name i\_spare55\_3

Is element of: GLA03 Main Record

Short Description: Spare 55\_3

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Spare in telemetry

Comments:

Product Var Name iCDfcmDLch\_8m

Is element of: GLA03 Main Record

Short Description: CD Fire Cmd 40 bit Latch Value 8 msb

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CD Fire Cmd 40 bit Latch Value 8 msb

Comments:

Product Var Name iCDfackLch\_8m

Is element of: GLA03 Main Record

Short Description: CD Fire Acknowledge 40 bit Latch Value 8 msb

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CD Fire Acknowledge 40 bit Latch Value 8 msb

Comments:

Product Var Name iCD\_GPSLch\_8m

Is element of: GLA03 Main Record

Short Description: CD GPS 40 bit Latch Value 8 msb

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CD GPS 40 bit Latch Value 8 msb

Comments:

Product Var Name iCD\_dataRdyCtr

Is element of: GLA03 Main Record

Short Description: CD Data Ready Counter

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65280

Description: CD Data Ready Counter. Bits 8 - 15 are the CD FIRE ACKNOWLEDGE COUNTER.

Comments:

Product Var Name iCD\_intsrc

Is element of: GLA03 Main Record

Short Description: CD Software Mode Flag

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description:

Comments:



Product Var Name iCD\_PWaccum

Is element of: GLA03 Main Record

Short Description: CD PW Limit Violation Counter

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 2147483647

Description:

Comments:

Product Var Name iCD\_PWLong

Is element of: GLA03 Main Record

Short Description: CD Long PW Violation Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 127

Description:

Comments:

Product Var Name iCD\_PWshort

Is element of: GLA03 Main Record

Short Description: CD Short PW Violation Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 127

Description:

## Comments:

Product Var Name iCD\_PWmsb

Is element of: GLA03 Main Record

Short Description: CD Short PW MSB

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 127

Description:

Comments:

Product Var Name i\_spare55\_4

Is element of: GLA03 Main Record

Short Description: Spare 55\_4

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Spare in telemetry

Comments:

Product Var Name iDC\_swFailct

Is element of: GLA03 Main Record

Short Description: DC Software Fail Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: Counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description:

Comments:

Product Var Name iDC\_shot\_ct

Is element of: GLA03 Main Record

Short Description: DC Shot Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: DC Shot Count

Comments:

Product Var Name iDC\_Xpos

Is element of: GLA03 Main Record

Short Description: DC X Position

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: DC X Position

Comments:

Product Var Name iDC\_Ypos

Is element of: GLA03 Main Record

Short Description: DC Y Position

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: DC Y Position

Comments:

Product Var Name iDC\_LPApkt\_ct

Is element of: GLA03 Main Record

Short Description: DC LPA Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: DC LPA Packets Sent

Comments:

Product Var Name iDC\_tmode\_rate

Is element of: GLA03 Main Record

Short Description: DC Test Mode Rate

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: DC Test Mode Rate

Comments:

Product Var Name iDC\_pkt\_ct

Is element of: GLA03 Main Record

Short Description: DC Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: DC Packets Sent

Comments:

Product Var Name iDC\_byte\_ct

Is element of: GLA03 Main Record

Short Description: DC Bytes Sent

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC Bytes Sent

Comments:

Product Var Name iDC\_outbitrate

Is element of: GLA03 Main Record

Short Description: DC Output bit rate in BPS

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC Output bit rate in BPS

Comments:

Product Var Name iDC\_IntReg

Is element of: GLA03 Main Record

Short Description: DC Interrupt register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC Interrupt register

Comments:

Product Var Name iDC\_CtlLchReg

Is element of: GLA03 Main Record

Short Description: DC Control latch register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC Control latch register

Comments:

Product Var Name iDC\_intMaskReg

Is element of: GLA03 Main Record

Short Description: DC Interrupt Mask Register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC Interrupt Mask Register; indicates which interrupts are enabled/disabled. Bit 0 is the DC Interrupt 1; value of 0 = Disabled, 1 = Enabled. Bit 1 is the DC LPA Interrupt; value of 0 = Disabled, 1 = Enabled. Bit 2 is the DC Output FIFO Empty Interrupt; value of 0 = Disabled, 1 = Enabled. Bit 3 is the DC Output FIFO Full Interrupt; value of 0 = Disabled, 1 = Enabled. Bit 4 is the DC RAM Busy Interrupt; value of 0 = Disabled, 1 = Enabled. Bit 5 is the DC Interrupt 6; value of 0 = Disabled, 1 = Enabled. All other bits are unused.

Comments:

Product Var Name iDC\_FIFO\_reg

Is element of: GLA03 Main Record

Short Description: DC fifo flags register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC FIFO flags register. Bit 0 is the DC FIFO Fill flag; value of 0 = True, 1 = false. Bit 1 is the DC FIFO almost empty flag; value of 0 = True, 1 = false. Bit 2 is the DC FIFO almost full flag; value of 0 = True, 1 = false. Bit 3 is the DC FIFO empty flag; value of 0 = True, 1 = false. All other bits are unused.

Comments:

Product Var Name IDC\_LPAGainReg

Is element of: GLA03 Main Record

Short Description: DC LPA gain register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC LPA gain register. Bits 0-2 are the LPA gain. Bit 3 is the LPA reset flag; value of 0 = In reset, 1 = not in reset.

Comments:

Product Var Name iDC\_LPACt\_reg

Is element of: GLA03 Main Record

Short Description: DC LPA packet count register

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: DC LPA packet count register. Bits 0 - 13 are the LPA frame byte count. Bits 16 - 23 are the LPA packet (frame) count.

Comments:

Product Var Name iDC\_spares

Is element of: GLA03 Main Record

Short Description: DC Spares

Product Data Type: i1b (8, 4)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: DC Spares

Product Var Name iGPS10secIntCt

Is element of: GLA03 Main Record

Short Description: GP GPS 10 second Interrupt Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP GPS 10 second Interrupt Count

Comments:

Product Var Name iGPPosPktRcvCt

Is element of: GLA03 Main Record

Short Description: GP Number of Position Packets received

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg



Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP Number of Position Packets received

Comments:

Product Var Name iGP\_HskPkt\_ct

Is element of: GLA03 Main Record

Short Description: GP Number of Housekeeping packets sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP Number of Housekeeping packets sent

Comments:

Product Var Name iGP\_AncPkt\_ct

Is element of: GLA03 Main Record

Short Description: GP Number of Ancillary Packets sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP Number of Ancillary Packets sent

Comments:

Product Var Name iGPS40bitReqCt

Is element of: GLA03 Main Record

Short Description: GP GPS 10 sec Pulse 40-Bit Counter Requests sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP GPS 10 sec Pulse 40-Bit Counter Requests sent

Comments:

Product Var Name iGPS40bitRcvCt

Is element of: GLA03 Main Record

Short Description: GP GPS 10 sec Pulse 40-Bit Counter Packets Received

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP GPS 10 sec Pulse 40-Bit Counter Packets Received

Comments:

Product Var Name iGP\_BadXYZ\_cnt

Is element of: GLA03 Main Record

Short Description: GP Packets with bad X,Y,Z Position Data

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: -32768

Product Maximum: 32768

Description: GP Packets with bad X,Y,Z Position Data

Comments:

Product Var Name iGP\_TolXYZ\_cnt

Is element of: GLA03 Main Record

Short Description: GP Packets with X,Y,Z data below Tolerance

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP Packets with X,Y,Z Position Data Below Tolerance

Comments:

Product Var Name iGP\_PktsSent

Is element of: GLA03 Main Record

Short Description: GP Number of Range Packets Sent

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: GP Number of Range Packets Sent

Comments:

Product Var Name iGP\_spares

Is element of: GLA03 Main Record

Short Description: GP Spares

Product Data Type: i1b (22, 4)

Total Bytes: 88

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GP Spares

Product Var Name iPC\_swerrct

Is element of: GLA03 Main Record

Short Description: PC Software Error Count

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Software Error Count

Comments:

Product Var Name iPC\_shot\_ct

Is element of: GLA03 Main Record

Short Description: PC Shot Counter

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: Photon counter (PC) Shot Counter

Comments:

Product Var Name iPC\_SciPkt\_ct

Is element of: GLA03 Main Record

Short Description: PC SCIENCE MODE PACKETS SENT

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC SCIENCE MODE PACKETS SENT

Comments:

Product Var Name iPC\_EngPkt\_ct

Is element of: GLA03 Main Record

Short Description: PC ENGINEERING MODE PACKETS SENT

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC ENGINEERING MODE PACKETS SENT

Comments:

Product Var Name iPC\_AncPkt\_ct

Is element of: GLA03 Main Record

Short Description: PC ANCILLARY MODE PACKETS SENT

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC ANCILLARY MODE PACKETS SENT

Comments:

Product Var Name iPC\_RDlyRcv\_ct

Is element of: GLA03 Main Record

Short Description: PC RANGE GATE DELAY PACKETS RECEIVED

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC RANGE GATE DELAY PACKETS RECEIVED

Comments:

Product Var Name iPC\_SPCMDly

Is element of: GLA03 Main Record

Short Description: PC SPCM Gate Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC SPCM Gate Delay

Comments:

Product Var Name iPC\_BG1Dly

Is element of: GLA03 Main Record

Short Description: PC Background 1 Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Background 1 Delay

Comments:

Product Var Name iPC\_BG2Dly

Is element of: GLA03 Main Record

Short Description: PC Background 2 Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Background 2 Delay

Comments:

Product Var Name iPC\_RGateDly

Is element of: GLA03 Main Record

Short Description: PC Range Gate Delay

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Range Gate Delay

Comments:

Product Var Name iPC\_HW\_stat

Is element of: GLA03 Main Record

Short Description: PC Hardware Mode Status Word

Product Data Type: i4b dictate)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: PC Hardware Mode Status Word. Bits 0 -2 indicate the PC board hardware mode; a value of 1=Idle, 2=Engineering, 4=Science. Bits 12 - 13 indicate the PC interrupt source; a value of 1=Fire Command, 2=Fire Acknowledge. Bit 14 is the PC measurement source; a value of 0=Fire Command, 1=Fire Acknowledge. All other bits are unused.

Comments:

Product Var Name IPC\_SPCM\_st

Is element of: GLA03 Main Record

Short Description: PC SPCM STATUS

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: PC SPCM (Single photon counting module) Status. Indicates which of the eight SPCMs are enable/disabled. A value of 0 = enabled, 1 = disabled. Bit 8 corresponds to SPCM 1. Bit 9 corresponds to SPCM 2. Bit 10 corresponds to SPCM 3. Bit 11 corresponds to SPCM 4. Bit 12 corresponds to SPCM 5. Bit 13 corresponds to SPCM 6. Bit 14 corresponds to SPCM 7. Bit 15 corresponds to SPCM 8. All other bits are unused.

Comments:

Product Var Name iPC\_DatRdyCtr

Is element of: GLA03 Main Record

Short Description: PC Data Ready Counter

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65535

Description: PC Data Ready Counter. Bits 8 - 15 are the PC FIRE ACKNOWLEDGE COUNTER.

Comments:

Product Var Name iPCSPCMraw\_1\_4

Is element of: GLA03 Main Record

Short Description: PC SPCM 1 THROUGH 4 RAW COUNTS

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The raw counts for SPCM 1, 2, 3,4. Bits 0-7 correspond to SPCM 1; bits 8 - 15 correspond to SPCM 2; bits 16 - 23 correspond to SPCM 3; bits 24 - 31 correspond to SPCM 4.

Comments:

Product Var Name iPCSPCMraw\_5\_8



Is element of: GLA03 Main Record

Short Description: PC SPCM 5 THROUGH 8 RAW COUNTS

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The raw counts for SPCM 5, 6, 7, 8. Bits 0-7 correspond to SPCM 5; bits 8 - 15 correspond to SPCM 6; bits 16 - 23 correspond to SPCM 7; bits 24 - 31 correspond to SPCM 8.

Comments:

Product Var Name iPCSPCM\_DCycle

Is element of: GLA03 Main Record

Short Description: PC SPCM Duty Cycle

Product Data Type: i4b (4)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: PC SPCM Duty Cycle

Comments:

Product Var Name iPC\_spare1

Is element of: GLA03 Main Record

Short Description: PC Spares

Product Data Type: i1b (2, 4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: PC spare

Product Var Name iC\_BSCalXstart

Is element of: GLA03 Main Record

Short Description: PC Coarse Boresite Calibration X Start Pos

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Coarse Boresite Calibration X Start Pos

Comments:

Product Var Name iC\_BSCalYstart

Is element of: GLA03 Main Record

Short Description: PC Coarse Boresite Calibration Y Start Pos

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Coarse Boresite Calibration Y Start Pos

Comments:

Product Var Name iF\_BSCalXstart

Is element of: GLA03 Main Record

Short Description: PC Fine Boresite Calibration X Start Pos

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Fine Boresite Calibration X Start Pos

Comments:

Product Var Name iF\_BSCalYstart

Is element of: GLA03 Main Record

Short Description: PC Fine Boresite Calibration Y Start Pos

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Fine Boresite Calibration Y Start Pos

Comments:

Product Var Name iC\_BSCalXinc

Is element of: GLA03 Main Record

Short Description: PC Coarse Boresite Calibration X Increment

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Coarse Boresite Calibration X Increment

Comments:

Product Var Name iC\_BSCalYinc

Is element of: GLA03 Main Record

Short Description: PC Coarse Boresite Calibration Y Increment

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Coarse Boresite Calibration Y Increment

Comments:

Product Var Name iF\_BSCalXinc

Is element of: GLA03 Main Record

Short Description: PC Fine Boresite Calibration X Increment

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Fine Boresite Calibration X Increment

Comments:

Product Var Name iF\_BSCalYinc

Is element of: GLA03 Main Record

Short Description: PC Fine Boresite Calibration Y Increment

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Fine Boresite Calibration Y Increment

Comments:

Product Var Name iC\_BSCalIntSec

Is element of: GLA03 Main Record

Short Description: PC Coarse Boresite Cal Integration Seconds

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Coarse Boresite Cal Integration Seconds

Comments:

Product Var Name iF\_BSCalIntSec

Is element of: GLA03 Main Record

Short Description: PC Fine Boresite Cal Integration Seconds

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Fine Boresite Cal Integration Seconds

Comments:

Product Var Name i\_BSCalXbest

Is element of: GLA03 Main Record

Short Description: PC Boresite Calibration Best X Position

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Boresite Calibration Best X Position

Comments:

Product Var Name i\_BSCalYbest

Is element of: GLA03 Main Record

Short Description: PC Boresite Calibration Best Y Position

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Boresite Calibration Best Y Position

Comments:

Product Var Name i\_BSCal\_remSec

Is element of: GLA03 Main Record

Short Description: PC Boresite Cal Seconds Remaining

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: PC Boresite Cal Seconds Remaining

Comments:

Product Var Name i\_spare55\_5

Is element of: GLA03 Main Record

Short Description: Spare 55\_5

Product Data Type: i1b (10, 4)

Total Bytes: 40

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Spares in telemetry

Comments:

Product Var Name iCT\_state

Is element of: GLA03 Main Record

Short Description: CT State Machine Current State

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6

Description: CT State Machine Current State

Comments:

Product Var Name iCTCmdEchoErrCt

Is element of: GLA03 Main Record

Short Description: CT COMMAND ECHO ERRORS

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT COMMAND ECHO ERRORS

Comments:

Product Var Name i\_LMBCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT LM BOARD CMDS RECEIVED

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT LM BOARD CMDS RECEIVED

Comments:

Product Var Name i\_TMBCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT TM BOARD CMDS RECEIVED

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT TM BOARD CMDS RECEIVED

Comments:

Product Var Name i\_MCBCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT MC BOARD CMDS RECEIVED

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT MC BOARD CMDS RECEIVED

Comments:

Product Var Name i\_HKBCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT HK BOARD CMDS RECEIVED

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HK BOARD CMDS RECEIVED



## Comments:

Product Var Name i\_HVPSCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT HVPS Cmds Received

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HVPS Cmds Received

## Comments:

Product Var Name i\_PDUCmdRcvCt

Is element of: GLA03 Main Record

Short Description: CT PDU Cmds Received

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT PDU Cmds Received

## Comments:

Product Var Name i\_HWtlm1Pkt\_ct

Is element of: GLA03 Main Record

Short Description: CT HW TLM 1 PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HW TLM 1 PACKETS SENT

Comments:

Product Var Name i\_HWt1m2Pkt\_ct

Is element of: GLA03 Main Record

Short Description: CT HW TLM 2 PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HW TLM 2 PACKETS SENT

Comments:

Product Var Name i\_HWt1m3Pkt\_ct

Is element of: GLA03 Main Record

Short Description: CT HW TLM 3 PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HW TLM 3 PACKETS SENT

Comments:

Product Var Name i\_HWt1m4Pkt\_ct

Is element of: GLA03 Main Record

Short Description: CT HW TLM 4 PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HW TLM 4 PACKETS SENT

Comments:

Product Var Name i\_HWtlm5Pkt\_ct

Is element of: GLA03 Main Record

Short Description: CT HW TLM 5 PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT HW TLM 5 PACKETS SENT

Comments:

Product Var Name iCtdwellPkt\_ct

Is element of: GLA03 Main Record

Short Description: CT DWELL PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT DWELL PACKETS SENT

Comments:

Product Var Name iCT\_AncPkt\_ct

Is element of: GLA03 Main Record

Short Description: CT ANCILLARY PACKETS SENT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT ANCILLARY PACKETS SENT

Comments:

Product Var Name iCT\_timeout\_ct

Is element of: GLA03 Main Record

Short Description: CT TIMEOUT COUNT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT TIMEOUT COUNT

Comments:

Product Var Name iCT\_int\_ct

Is element of: GLA03 Main Record

Short Description: CT INTERRUPT COUNT

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT INTERRUPT COUNT

Comments:

Product Var Name iCT\_ShotCtErr

Is element of: GLA03 Main Record

Short Description: CT Shot Counter Errors

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Shot Counter Errors

Comments:

Product Var Name iCT\_dwell\_mode

Is element of: GLA03 Main Record

Short Description: CT Dwell Mode

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32

Description: CT Dwell Mode

Comments:

Product Var Name iCT\_dwell\_chnl

Is element of: GLA03 Main Record

Short Description: CT Dwell Channel

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Dwell Channel

Comments:

Product Var Name iCTLMBmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT Laser Monitor Board Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Laser Monitor Board Mux Error Counter

Comments:

Product Var Name iCTHKBmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT Housekeeping Board Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Housekeeping Board Mux Error Counter

Comments:

Product Var Name iCTHKBsmxErrCt

Is element of: GLA03 Main Record

Short Description: CT Housekeeping Board Submux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Housekeeping Board Submux Error Counter

Comments:

Product Var Name iCTTCBmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT Temperature Controller Board Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Temperature Controller Board Mux Error Counter

Comments:

Product Var Name iCTMCBmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT Mechanism Controller Board Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Mechanism Controller Board Mux Error Counter

Comments:

Product Var Name iCTHVPSmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT High Voltage Power Supply Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT High Voltage Power Supply Mux Error Counter

Comments:

Product Var Name iCTPDUmuxErrCt

Is element of: GLA03 Main Record

Short Description: CT Power Distribution Unit Mux Error Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Power Distribution Unit Mux Error Counter

Comments:

Product Var Name iCT\_CEchoSucCt

Is element of: GLA03 Main Record

Short Description: CT Command Echo Success Count

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: CT Command Echo Success Count

Comments:

Product Var Name iCT\_SupErrflag

Is element of: GLA03 Main Record

Short Description: CT Suppressed Event Message Error Flags

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0



Product Maximum: 32768

Description:

Comments:

Product Var Name iCT\_LHP1tcstat

Is element of: GLA03 Main Record

Short Description: CT LHP1 Temperature Control State

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2tcstat

Is element of: GLA03 Main Record

Short Description: CT LHP2 Temperature Control State

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP1tsp

Is element of: GLA03 Main Record

Short Description: CT LHP1 Temperature Setpoint

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2tsp

Is element of: GLA03 Main Record

Short Description: CT LHP2 Temperature Setpoint

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP1tcctr

Is element of: GLA03 Main Record

Short Description: CT LHP1 Temperature Control Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2tcctr

Is element of: GLA03 Main Record

Short Description: CT LHP2 Temperature Control Counter

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP1\_Tmin

Is element of: GLA03 Main Record

Short Description: CT LHP1 Minimum Temperature

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2\_Tmin

Is element of: GLA03 Main Record

Short Description: CT LHP2 Minimum Temperature

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP1\_Tdelta

Is element of: GLA03 Main Record

Short Description: CT LHP1 Temperature Change

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2\_Tdelta

Is element of: GLA03 Main Record

Short Description: CT LHP2 Temperature Change

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP1\_Tcyct

Is element of: GLA03 Main Record

Short Description: CT LHP1 Temperature Control Cycle Time

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_LHP2\_Tcyct

Is element of: GLA03 Main Record

Short Description: CT LHP2 Temperature Control Cycle Time

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name iCT\_miscFlag

Is element of: GLA03 Main Record

Short Description: CT Misc Status Flags

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description:

Comments:

Product Var Name ICT\_spares

Is element of: GLA03 Main Record

Short Description: CT Spares

Product Data Type: i1b (11, 4)

Total Bytes: 44

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: CT Spares

Product Var Name i\_phdr\_ad

Is element of: GLA03 Main Record

Short Description: Primary Header APID 12 or 13

Product Data Type: i1b (6, 64)

Total Bytes: 384

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 12 or 13

Comments:

Product Var Name i\_shdr\_ad

Is element of: GLA03 Main Record

Short Description: Secondary Header 12 or 13 (time stamp)

Product Data Type: i1b (8, 64)

Total Bytes: 512

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header 12 or 13 (time stamp)

Comments:

Product Var Name i\_phdr\_15

Is element of: GLA03 Main Record

Short Description: Primary Header APID 15

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 15

## Comments:

Product Var Name i\_shdr\_15

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 15 (time stamp)

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 15 (time stamp)

## Comments:

Product Var Name i\_phdr\_17

Is element of: GLA03 Main Record

Short Description: Primary Header APID 17

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 17

## Comments:

Product Var Name i\_shdr\_17

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 17 (time stamp)

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 17 (time stamp)

Comments:

Product Var Name i\_phdr\_19

Is element of: GLA03 Main Record

Short Description: Primary Header APID 19

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Primary Header APID 19

Comments:

Product Var Name i\_shdr\_19

Is element of: GLA03 Main Record

Short Description: Secondary Header APID 19 (time stamp)

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: Secondary Header APID 19 (time stamp)

Comments:

Product Var Name i\_sctr\_19

Is element of: GLA03 Main Record

Short Description: Shot Counter APID 19

Product Data Type: i2b (16)

Total Bytes: 32

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA



Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Shot Counter APID 19

Comments:

Product Var Name i\_chin\_flag

Is element of: GLA03 Main Record

Short Description: Check-In Flags, Mask 0x1F

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: null

Product Maximum: null

Description: The Check-in Flag indicates what telemetry tasks are represented in the current ancillary science packet: AD Task, Mask = 0x01; PC Task, Mask = 0x02; CD Task, Mask = 0x04; GP Task, Mask = 0x08; CT Task, Mask = 0x10; Bit value of 1=task tlm in ancillary pkt, 0=task tlm NOT in ancillary pkt. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_RMS\_loc

Is element of: GLA03 Main Record

Short Description: RMS Noise Calculation Location

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Location of RMS noise calculation: starting digitizer element number. RMS location start time. DSP tlm. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_sctrPDlyWF

Is element of: GLA03 Main Record

Short Description: Shot Counter for Post Delay WF

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Shot counter for the Post delay pulse waveform. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_dlaywf\_start

Is element of: GLA03 Main Record

Short Description: Post Delay Pulse Waveform Start Address

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Start address of the Post delay laser pulse waveform in nanosecond resolution relative to the first sample of the waveform. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_PDlyWf

Is element of: GLA03 Main Record

Short Description: Sampled Post Delay Pulse Waveform

Product Data Type: i1b (32, 16)

Total Bytes: 512

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Sampled post delay pulse waveform. Note: offset for this data is from the transmit pulse peak. Dimensioned to 32 by 16 because 32 samples occur once per second.

Comments:

Product Var Name i\_otswf\_start

Is element of: GLA03 Main Record

Short Description: OTS Pulse Waveform Start Address

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Start address of the following four Optical Test System (OTS) laser pulse waveforms in nanosecond resolution relative to the first sample of the waveform. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_sctrOTSWf

Is element of: GLA03 Main Record

Short Description: Shot Counter for OTS WF

Product Data Type: i4b (4, 16)

Total Bytes: 256

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 65535

Description: Shot counters for the OTS pulse waveforms. Dimensioned to 4 by 16 because 4 OTS waveforms occur each second.

Comments:

Product Var Name i\_OTSPWf

Is element of: GLA03 Main Record

Short Description: Sampled OTS Pulse Waveform

Product Data Type: i1b (128, 16)

Total Bytes: 2048

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Sampled OTS pulse waveform. Note: offset for this data is from the laser fire. Dimensioned to 32 by 64 because 32 samples occur 4 times per second.

Comments:

Product Var Name i\_cTx\_win\_loc

Is element of: GLA03 Main Record

Short Description: Commanded Location of Transmit Pulse Search Window

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cNumNoTxing

Is element of: GLA03 Main Record

Short Description: Commanded Number of No Threshold Crossings

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Number of no threshold crossing shots for error condition. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_spare19\_1

Is element of: GLA03 Main Record

Short Description: Spare APID19 1

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare byte from telemetry packet. Dimensioned to 16 because occurs once per second.

Product Var Name i\_cTxThresh

Is element of: GLA03 Main Record

Short Description: Commanded Transmit Pulse Threshold Value

Product Data Type: i2b (16)

Total Bytes: 32

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cRwinSf

Is element of: GLA03 Main Record

Short Description: Commanded Range Window Weighting Scale Factors

Product Data Type: i4b (24, 16)

Total Bytes: 1536

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Reflects commanded value. Dimensioned to 24 by 16 because 4 scale factors per each filter (6) occurs each second.

Comments:

Product Var Name i\_cBgCoeff

Is element of: GLA03 Main Record

Short Description: Commanded Background Coefficients

Product Data Type: i4b (18, 16)

Total Bytes: 1152

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Reflects commanded value. Background noise coefficients A1, A2, A3 for the 4ns, 8ns, 16ns, 32ns, 64ns, and 128ns filter. Dimensioned 3 by 6 by 16 because 3 coefficients occur for the filter per second.

Comments:

Product Var Name i\_spare19\_2

Is element of: GLA03 Main Record

Short Description: Spare APID19 2

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spare in the telemetry. Dimensioned to 16 because occurs once per second.

Product Var Name i\_cEnAGC

Is element of: GLA03 Main Record

Short Description: Commanded Enable/Disable AGC

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Enable/Disable Auto Gain Calculation. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cEnAGC\_4

Is element of: GLA03 Main Record

Short Description: Commanded Enable/Disable Use 4ns Filter for AGC

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Enable/Disable Use 4ns Filter for AGC. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cRetGn

Is element of: GLA03 Main Record

Short Description: Commanded Return Gain Value

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: Return Gain Value. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_A

Is element of: GLA03 Main Record

Short Description: Commanded AGC A Parameter

Product Data Type: i4b (4, 16)

Total Bytes: 256

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC A Parameters. Reflects commanded value. Dimensioned to 4 by 16 because 4 parameters occur per second.

Comments:

Product Var Name i\_cAGC\_B

Is element of: GLA03 Main Record

Short Description: Commanded AGC B Parameter

Product Data Type: i4b (4, 16)

Total Bytes: 256

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC B Parameters. Reflects commanded value. Dimensioned to 4 by 16 because 4 parameters occur per second.

Comments:

Product Var Name i\_cAGC\_C

Is element of: GLA03 Main Record

Short Description: Commanded AGC C Parameter

Product Data Type: i4b (2, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC C0 and C1 Parameters. Reflects commanded value. Dimensioned to 2 by 16 because 2 parameters occur per second.

Comments:

Product Var Name i\_cAGC\_Gmax

Is element of: GLA03 Main Record

Short Description: Commanded AGC Gmax Parameter

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg



Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 100

Description: AGC Gmax Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Gmin

Is element of: GLA03 Main Record

Short Description: Commanded AGC Gmin Parameter

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 100

Description: AGC Gmin Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Ginit

Is element of: GLA03 Main Record

Short Description: Commanded AGC Ginit Parameter

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 100

Description: AGC Ginit Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Zmax

Is element of: GLA03 Main Record

Short Description: Commanded AGC Zmax Parameter

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC Zmax Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Zmin

Is element of: GLA03 Main Record

Short Description: Commanded AGC Zmin Parameter

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC Zmin Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Vref

Is element of: GLA03 Main Record

Short Description: Commanded AGC Vref Parameter

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: AGC Vref Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cAGC\_Vmin

Is element of: GLA03 Main Record

Short Description: Commanded AGC Vmin Parameter

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: AGC Vmin Parameter. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cFiltCTol

Is element of: GLA03 Main Record

Short Description: Commanded Filter Coincidence Tolerance

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Tolerance for coincidence of all filters. Reflects commanded value. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_cRwinDOff

Is element of: GLA03 Main Record

Short Description: Commanded Range Window Dump Offsets

Product Data Type: i4b (6, 16)

Total Bytes: 384

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 200

Description: Range Window Dump Offsets. Offsets applied to trailing edge of range pulse for the selection of the 1000 sample region to be downlinked. Each filter is given a separate offset. Index 0 => 4 nanosecond filter, Index 1 => 8 nanosecond filter, Index 2 => 16 nanosecond filter, Index 3 => 32 nanosecond filter, Index 4 => 64 nanosecond filter and Index 5 => 128 nanosecond filter. Reflects commanded value. Dimensioned to 6 by 16 because offset occurs for each filter (6) per second.

Comments:

Product Var Name i\_cRetFThr

Is element of: GLA03 Main Record

Short Description: Commanded Return Pulse Filter Threshold Values

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: Reflects commanded value. The return pulse threshold values for all filters. Dimensioned to 6 by 16 because occurs for each filter (6) per second.

Comments:

Product Var Name i\_spare\_tlm21

Is element of: GLA03 Main Record

Short Description: Spare 21

Product Data Type: i1b (2, 16)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_cFIRCoeff

Is element of: GLA03 Main Record

Short Description: Commanded FIR Coefficients

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: FIR COEFFICIENTS ? aabb ccdd xxyy zzww; set of eight 8-bit coefficients used by the FIR Filter engine for all filtering conditions. Aabb ccdd ? First set of coefficients. Xxyy zzww? Second set of coefficients. Reflects commanded value. Dimensioned to 8 by 16 because 8 coefficients occur per second.

Comments:

Product Var Name i\_FWminStDev

Is element of: GLA03 Main Record

Short Description: Filter Weight Minimum Standard Deviation

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Filter weight minimum standard deviation.

Comments:

Product Var Name i\_FNzMinThr

Is element of: GLA03 Main Record

Short Description: Filter Noise Minimum Thresholds for each Filter

Product Data Type: i4b (6, 16)

Total Bytes: 384

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: Filter Noise Minimum Thresholds for each Filter (4ns, 8ns, 16 ns, 32 ns, 64 ns, 128ns).

Comments:

Product Var Name i\_FRejMskLead

Is element of: GLA03 Main Record

Short Description: Filter reject mask for leading edge

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description:

Comments:

Product Var Name i\_FRejMskTrail

Is element of: GLA03 Main Record

Short Description: Filter reject mask for trailing edge

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description:

Comments:

Product Var Name i\_spare19\_3

Is element of: GLA03 Main Record

Short Description: Spare APID19 3

Product Data Type: i1b (22, 16)

Total Bytes: 352

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spares in the telemetry. Dimensioned to 22 by 16 because 22 bytes occur per second.

Product Var Name i\_shotctr\_40

Is element of: GLA03 Main Record

Short Description: Shot Counter

Product Data Type: i2b (40, 16)

Total Bytes: 1280

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 1

Product Maximum: 200

Description:

Comments:

Product Var Name i\_fack\_time

Is element of: GLA03 Main Record

Short Description: Fire Acknowledge Time

Product Data Type: i1b (200, 16)

Total Bytes: 3200

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: Fire Acknowledge Time (from Freq and Time Bd). Freq & Time Board TIm, 40 bit counter. Dimensioned (5,40,16).

Comments:

Product Var Name i\_fcnd\_time

Is element of: GLA03 Main Record

Short Description: Fire Command Time

Product Data Type: i1b (200, 16)

Total Bytes: 3200

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 128

Description: Fire Command Time (from Freq and Time Bd). Freq & Time Board TIm, 40 bit counter. Dimensioned (5,40,16).

Comments:

Product Var Name i\_calcSClat

Is element of: GLA03 Main Record

Short Description: Latitude

Product Data Type: i2b (16)

Total Bytes: 32

Product Units: Degrees

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -90

Product Maximum: 90

Description: S/C latitude calculated from s/c position data in degrees. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_calcSClon

Is element of: GLA03 Main Record

Short Description: Longitude

Product Data Type: i2b (16)

Total Bytes: 32

Product Units: Degrees

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360

Description: S/C longitude calculated from s/c position data in degrees. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Hsat

Is element of: GLA03 Main Record

Short Description: Height (Hsat)

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 800000

Description: S/C geodetic altitude of s/c above earth's surface in kilometers. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Rsat

Is element of: GLA03 Main Record

Short Description: Rsat

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 800000

Description: Distance from s/c to center of earth in kilometers. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Rmin

Is element of: GLA03 Main Record

Short Description: Rmin

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 800000

Description: Range window start in kilometers. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Rmax

Is element of: GLA03 Main Record

Short Description: Rmax

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 800000

Description: Range window stop in kilometers. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Wmin

Is element of: GLA03 Main Record

Short Description: Wmin

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: Minimum window size. Default is 2km. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Wmax

Is element of: GLA03 Main Record

Short Description: Wmax

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 100000

Description: Maximum window size. Default is 11km. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Hoffmin

Is element of: GLA03 Main Record

Short Description: Hoffmin (DEM uncertainty + bias)

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 10000

Description: Offset associated with the minimum height. Default is 1.125km. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Hoffmax

Is element of: GLA03 Main Record

Short Description: Hoffmax (DEM uncertainty - bias)

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2000

Product Maximum: 10000

Description: Offset associated with the maximum height. Default is negative 0.875km. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_Rbmin

Is element of: GLA03 Main Record

Short Description: Rbmin

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 10000

Description: Bias added to the minimum range for Altimeter Digitizer (in kilometers). Default is 0. Dimensioned to 16 because occurs once per second.

## Comments:

Product Var Name i\_Rbmax

Is element of: GLA03 Main Record

Short Description: Rbmax

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -2000

Product Maximum: 10000

Description: Bias added to the maximum range for Altimeter Digitizer (in kilometers). Default is 0. Dimensioned to 16 because occurs once per second.

## Comments:

Product Var Name i\_ObSurfType

Is element of: GLA03 Main Record

Short Description: Surface Type

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Surface type from telemetry data: 0=ocean & no ice; 1=land & no ice; 2=ocean & ice; 3=land & ice. Dimensioned to 16 because occurs once per second.

## Comments:

Product Var Name i\_PosDatFlg

Is element of: GLA03 Main Record

Short Description: Position data valid flag

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Set to zero(0) if no errors detected during position data processing, otherwise non-zero. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_SCPosPkt

Is element of: GLA03 Main Record

Short Description: Spacecraft Time and Position Packet

Product Data Type: i1b (40, 16)

Total Bytes: 640

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Spacecraft position and GPS Time command packet received over 1553 bus minus 8 byte CCSDS command header. Format is defined in spacecraft ICD.

Comments:

Product Var Name i\_SCPosPktShot

Is element of: GLA03 Main Record

Short Description: Shot Count for 1553 Spacecraft Time and Position Packet

Product Data Type: i2b (16)

Total Bytes: 32

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Shot count captured by RT task when it receives spacecraft position and command packet. Only lower 8 bits valid

Comments:

Product Var Name i\_SCPosPktGMET

Is element of: GLA03 Main Record

Short Description: GLAS MET for 1553 Spacecraft Time and Position Packet

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: GLAS MET captured by RT task when it receives spacecraft position and command packet.

Comments:

Product Var Name i\_DEMmin

Is element of: GLA03 Main Record

Short Description: DEM minimum byte

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: DEM minimum elevation byte used to calculate hmin. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_DEMmax

Is element of: GLA03 Main Record

Short Description: DEM maximum byte

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: DEM maximum elevation byte used to calculate hmax. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_RngDatSrc

Is element of: GLA03 Main Record

Short Description: Range data source

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 2

Description: Source of range data: 0=s/c time & pos pkt; 1=uplinked DEM bytes; 2=uplinked Rmin/Rmax. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_FTLatch

Is element of: GLA03 Main Record

Short Description: GPS 10 Sec Pulse 40 bit count value

Product Data Type: i1b (5, 16)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Last 40-bit count value from frequency & time board. Corresponds to the last GPS 10 second pulse. Dimensioned to 16 because the latch time occurs once per second. 2 4-byte items because the latch value is 40 bits. The upper 24 bits are not used.

Comments:

Product Var Name i\_GPSppsGMET

Is element of: GLA03 Main Record

Short Description: GLAS MET for GPS 0.1 Hz Pulse

Product Data Type: i1b (6, 16)

Total Bytes: 96

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: GLAS MET at time of last GPS 10 sec pulse (in VTCW format)

## Comments:

Product Var Name i\_spare19\_4

Is element of: GLA03 Main Record

Short Description: Spare APID 19

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spares in the telemetry. Dimensioned to 8 by 16 because 8 bytes occur per second.

Product Var Name i\_et\_cal\_mode

Is element of: GLA03 Main Record

Short Description: Etalon Calibration - Current mode

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 3

Description: Current mode of Etalon calibration: OFF=0, Acquire=1, Tracking=2 or Invalid=3. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_ET\_state

Is element of: GLA03 Main Record

Short Description: Etalon State

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No



Product Minimum: 0

Product Maximum: 4

Description: The state of the etalon: Init=0, Set Temp=1, Wait=2, Average=3. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_ETsettleTime

Is element of: GLA03 Main Record

Short Description: Etalon Temperature Settle Time

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Etalon Temperature Settle Time. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_ET\_Flags

Is element of: GLA03 Main Record

Short Description: Etalon Flags

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Etalon Flags. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_onax\_xmit

Is element of: GLA03 Main Record

Short Description: Etalon Averaged on-axis transmission

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Averaged on-axis transmission. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_offax\_xmit

Is element of: GLA03 Main Record

Short Description: Etalon Averaged off-axis transition

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Averaged off-axis transmission. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_temperr

Is element of: GLA03 Main Record

Short Description: Etalon Temperature Error

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Temperature Error. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_trkfltout

Is element of: GLA03 Main Record

Short Description: Etalon Tracking Loop Filter output

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Tracking Loop Filter output. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_trkfltavg

Is element of: GLA03 Main Record

Short Description: Etalon Tracking Failure Average

Product Data Type: i4b (16)

Total Bytes: 64

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Etalon Tracking Failure Average. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_StartTemp

Is element of: GLA03 Main Record

Short Description: Start Temperature

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Start Temperature. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_StopTemp

Is element of: GLA03 Main Record

Short Description: Stop Temperature

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Stop Temperature. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_TempStep

Is element of: GLA03 Main Record

Short Description: Temperature Step

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: celsius

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Temperature Step. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_acqavg\_tm

Is element of: GLA03 Main Record

Short Description: Etalon Averaging time for acquire command

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: seconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Etalon averaging time for acquire command. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_acqset\_tm

Is element of: GLA03 Main Record

Short Description: Etalon Temperature settle time for acquire cmd

Product Data Type: i2b ( 16)

Total Bytes: 32

Product Units: seconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Etalon Temperature settle time for acquire cmd. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_update\_ctr

Is element of: GLA03 Main Record

Short Description: Etalon averaging update counter

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: Etalon averaging update counter. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_et\_spare

Is element of: GLA03 Main Record

Short Description: ET Spare

Product Data Type: i1b (16)

Total Bytes: 16

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA03 et spare.

Product Var Name i\_DualPinA

Is element of: GLA03 Main Record

Short Description: Dual Pin A

Product Data Type: i1b (40, 16)

Total Bytes: 640

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: From Laser Monitor Board. Each corresponds to one of the 40 shots. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_DualPinB

Is element of: GLA03 Main Record

Short Description: Dual Pin B

Product Data Type: i1b (40, 16)

Total Bytes: 640

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: From Laser Monitor Board. Each corresponds to one of the 40 shots. Dimensioned to 16 because occurs once per second.

Comments:

Product Var Name i\_532nrg

Is element of: GLA03 Main Record

Short Description: Etalon 532 Energy

Product Data Type: i1b (40, 16)

Total Bytes: 640

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 32768

Description: Etalon 532 Energy.

Comments:

Product Var Name i\_APID\_AvFig

Is element of: GLA03 Main Record

Short Description: Availability Flag

Product Data Type: i1b (8, 16)

Total Bytes: 128

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections. Please see the PDF flag description for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href="flags/i\_timecorflg.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_spare4

Is element of: GLA03 Main Record

Short Description: Spare 4

Product Data Type: i1b (78)

Total Bytes: 78

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No



Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_dShotTime

Is element of: GLA01 Main Record, GLA04 LPA Main Record, GLA05 record, GLA06 record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Laser Shot Time Deltas (shots 2-40)

Product Data Type: i4b (39)

Total Bytes: 156

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1200000

Description: The time deltas of pulses 2 through 40 to i\_UTCTime, the UTC time tag of the first pulse in the 1-second data frame. Adding the deltas to i\_UTCTime will give the user the time of each individual shot in the frame.

Comments: To calculate the time for shots 2-40, add these deltas to the time of the first shot.

Product Var Name i\_shot\_cntr

Is element of: GLA04 LPA Main Record

Short Description: Shot Counter

Product Data Type: i2b (40)

Total Bytes: 80

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: The forty Shot Counters corresponding to LPA Data. These match the corresponding waveform records on the GLA01 product.

Comments:

Product Var Name i\_GPSLatch

Is element of: GLA04 LPA Main Record

Short Description: GPS Latch Time

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: The GPS time that was used to convert the frequency board time to J2000 for the lasers shot times in this record. The GPS time is normally updated approximately every 10 seconds; the previous latch time will repeat until a new one is received.

Comments:

Product Var Name i\_boxX

Is element of: GLA04 LPA Main Record

Short Description: X Position of Box

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 79

Description: X Coordinate for the top left corner of the 20 by 20 LPA image data, 0 to 79. To map the LPA image into the LRS image the LPA image needs to be rotated 90 degrees clockwise. So the LPA rotated to LRS (column) upper left X corner is 79 minus i\_boxY minus 19.

Comments:

Product Var Name i\_boxY

Is element of: GLA04 LPA Main Record

Short Description: Y Position of Box

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 79

Description: Y Coordinate for the top left corner of the 20 by 20 LPA image data, 0 to 79. To map the LPA image into the LRS image the LPA image needs to be rotated 90 degrees clockwise. So the LPA rotated to LRS (row) upper left Y corner is i\_boxX.

## Comments:

Product Var Name i\_PixInt

Is element of: GLA04 LPA Main Record

Short Description: LPA Data

Product Data Type: i1b (400, 40)

Total Bytes: 16000

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: The forty per second images of the laser pulse. 20x20 box of LPA pixel intensity data. Row 1 column 1 to 20 first, then row 2 to 20. Row is Y and column is X. To map the LPA image into the LRS image the LPA image needs to be rotated 90 degrees clockwise.

## Comments:

Product Var Name i\_tx\_wf

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Sampled Transmit Pulse Waveform

Product Data Type: i1b (48, 40)

Total Bytes: 1920

Product Units: counts

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: Transmit Pulse; 48 bytes of raw data samples.

## Comments:

Product Var Name i\_time\_txWfPk

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Transmit Pulse Peak Location

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 500000

Description: Address in digitizer counts of the Transmit Pulse Peak as measured from the start of Acquisition Memory, i.e. start of digitization. From APID12/13, Offset 68.

Comments: The range measurement starts from this time. To accurately time stamp the transmit pulse, it is necessary to add the delay to start of digitizer.

Product Var Name `i_TxWfStart`

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Starting Address of Transmit Pulse Sample

Product Data Type: i4b (40)

Total Bytes: 160

Product Units: ns

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 500000

Description: Starting Address in digitizer counts of the Transmit Pulse sample relative to the start of digitization. From APID12/13, Offset 76.

Comments:

Product Var Name `i_txWfPk_Flag`

Is element of: GLA01 Main Record, GLA04 LPA Main Record

Short Description: Transmit Waveform Peak Status Flag

Product Data Type: i1b (40)

Total Bytes: 40

Product Units: n/a

Invalid Value/Flag: `i_APID_AvFlg`

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 8

Description: `Transmit_Peak_Status`. Status Word: Bit 0: If bit is set to 1 (true), then internal software failure. Bit 1: If bit is set to 1 (true), then peak is below threshold. Bit 2: If bit is set to 1 (true), peak was not found. Note: once set to true, Bit 2 is latched and is only cleared by a DSP board reset or by a ground command. From APID12/13, Offset 72.

Please see <a href='flags/i\_txWfPk\_Flag.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name `i_lpa_spare0`

Is element of: GLA04 LPA Main Record

Short Description: LPA Spare 0

Product Data Type: i1b (120)

Total Bytes: 120

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_lpa\_spare1

Is element of: GLA04 LPA Main Record

Short Description: LPA Spare 1

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07

Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_samp\_time

Is element of: GLA04 LRS Main Record

Short Description: Sample Time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The 10 times of the LRS data as computed from the VTCW converted by using GPS if available and time offsets to the GLAS laser 10 hertz signal (every fourth fire cmd). The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time).

Comments:

Product Var Name i\_shot\_time

Is element of: GLA04 LRS Main Record

Short Description: Shot time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The time for each of the 10 laser shots based on alignment to GLA01 using GPS time if available. The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time)

Comments:

Product Var Name i\_shot\_ctr

Is element of: GLA04 LRS Main Record

Short Description: shot numbers

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 1

Product Maximum: 200

Description: Shot numbers for the 10 laser fire commands associated with the LRS data.

Comments:

Product Var Name i\_lrs\_vtcw

Is element of: GLA04 LRS Main Record

Short Description: LRS VTCW Time Tag

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Raw VTCW counts converted to seconds.

Comments:

Product Var Name i\_lrs\_timetag

Is element of: GLA04 LRS Main Record

Short Description: LRS Time Tag

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg



Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1000000

Description: LRS SA-2 Time Tag, Sample 1-10. The time increment to GLAS 10 Hz pulse.

Comments:

Product Var Name i\_lrs\_msginc

Is element of: GLA04 LRS Main Record

Short Description: LRS Message Incomplete Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: LRS SA-2 Message Incomplete Flag, Sample 1-10

Comments:

Product Var Name i\_lrs\_flag

Is element of: GLA04 LRS Main Record

Short Description: LRS Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: LRS Flag Byte. Please see <[a href='flags/i\\_lrs\\_flag.pdf'](flags/i_lrs_flag.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_lrs\_TkrMode

Is element of: GLA04 LRS Main Record

Short Description: LRS Tracker Mode Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 7

Description: LRS SA-2 Tracker Mode Status, Sample 1-10

Comments:

Product Var Name i\_lrs\_tspare2

Is element of: GLA04 LRS Main Record

Short Description: LRS Spare 2

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: LRS SA-2 Spare 1, Sample 1-10

Product Var Name i\_lrs\_DiagStat

Is element of: GLA04 LRS Main Record

Short Description: LRS Diagnostic Sub-Mode Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: LRS SA-2 Diagnostic Sub-Mode Status, Sample 1-10

Comments:

Product Var Name i\_lrs\_LastPCmd

Is element of: GLA04 LRS Main Record

Short Description: LRS Last Processed Command ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: LRS SA-2 Last Processed Command ID, Sample 1-10

Comments:

Product Var Name i\_lrs\_RollCt

Is element of: GLA04 LRS Main Record

Short Description: LRS Time Tag Rollover Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: LRS SA-2 Time Tag Rollover Count, Samples 1-10

Comments:

Product Var Name i\_lrs\_tspare3

Is element of: GLA04 LRS Main Record

Short Description: LRS Spare 3

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: LRS SA-2 Spare 1, Sample 1-10

Product Var Name i\_lrs\_VTkrSt

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Trackers State

Product Data Type: i1b (3, 10)

Total Bytes: 30

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: State of IST SA-8 Virtual Trackers 0-2 for Samples 1-10. For each tracker byte value indicates the state. Values are 0=Offline, 1=Standby, 2=Acq1, 3=Acq2, 4=RedAcq1, 5=RedAcq2, 6=Handoff1, 7=Handoff2, 8=Handoff3, 9=Handoff4, 10=Handoff5, 11=Track, 12=U12 bad, 13=U13 bad, 14=U14 bad, 15=AwaitAcq. Tracker 0 starts at byte 1.

Comments:

Product Var Name i\_lrs\_stat

Is element of: GLA04 LRS Main Record

Short Description: LRS SA-2 Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Bit Flags. Bit 7 = Fault Detection Summary (0/Clear 1/Set); Bit 6 = Cold Boot Indicator (0/Clear 1/Set); Bit 5 = Time Mark Received (0/Clear 1/Set); Bit 4 = Software Reset Event (0/Clear 1/Set); Bit 3 = Sync Mode (0/External 1/Internal); Bit 2 = Invalid Command (0/Clear 1/Set); Bit 1 = TEC Enbl/Dsbl Status (0/Dsbl 1/Enbl); Bit 0 = Command Ignored Flag (0/Clear 1/Set)

Comments:

Product Var Name i\_lrs\_TimeMark

Is element of: GLA04 LRS Main Record

Short Description: LRS Time Mark ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: LRS SA-2 Time Mark ID, Sample 1-10

Comments:

Product Var Name i\_lrs\_CamID

Is element of: GLA04 LRS Main Record

Short Description: LRS Camera ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: LRS SA-2 Camera ID, Sample 1-10

Comments:

Product Var Name i\_lrs\_swVID

Is element of: GLA04 LRS Main Record

Short Description: LRS Software Version ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: LRS SA-2 Software Version ID, Sample 1-10

Comments:

Product Var Name i\_LPAC13\_t1

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Laser Profiler Array (LPA) Temperature 1, Ch 13

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 4000

Description: Oscillator Board Temperature, Ch 13

Comments:

Product Var Name i\_Vtstarvalid

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Star Valid

Product Data Type: i1b (3, 10)

Total Bytes: 30

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1

Description: Star Valid Flag for LRS SA-2 Virtual Trackers 0 - 2, Samples 1-10

Comments:

Product Var Name i\_lrs\_tspare4

Is element of: GLA04 LRS Main Record

Short Description: LRS Spare 4

Product Data Type: i1b (30)

Total Bytes: 30

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: Spares 4,5,6 from LRS SA-2 trackers 0-2, samples 1-10.

Product Var Name i\_VTEEnergy

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Encircled Energy

Product Data Type: i2b (3, 10)

Total Bytes: 60

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Encircled Energy for LRS SA-2 Virtual Trackers 0 - 2, Samples 1-10

Comments:

Product Var Name i\_VTBgBias

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Bckgrnd Bias

Product Data Type: i2b (3, 10)

Total Bytes: 60

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1023

Description: Bckgrnd Bias for LRS SA-2 Virtual Trackers 0 - 2, Samples 1-10

Comments:

Product Var Name i\_VTCentR

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Centroid Row

Product Data Type: i4b (3, 10)

Total Bytes: 120

Product Units: Arc-seconds\*1.0d6

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1800000000

Description: Centroid Row from LRS SA-2 Virtual Trackers 0 - 2, Samples 1-10. Row is Y. The row (0 to 15) within the image data (i\_T0\_SA) is i\_VTCentR minus i\_Irs\_RawRow.

Comments:

Product Var Name i\_VTCentC

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Centroid Column

Product Data Type: i4b (3, 10)

Total Bytes: 120

Product Units: Arc-seconds\*1.0d6

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1800000000

Description: Centroid Column from LRS SA-2 Virtual Trackers 0 - 2, Samples 1-10. Column is X. The column (0 to 15) within the image data (i\_T0\_SA) is i\_VTCentC minus i\_Irs\_RawCol.

Comments:

Product Var Name i\_IrsTimCofInt

Is element of: GLA04 LRS Main Record

Short Description: LRS Time to Center of Integration

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 131070000

Description: LRS SA-29 Time to Center of Integration, Samples 1-10

Comments:

Product Var Name i\_Irs\_RawRow

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Raw Row

Product Data Type: i2b (3, 10)

Total Bytes: 60

Product Units: pixels

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 495

Description: Raw row data from LRS SA-2 trackers 0-2, Samples 1-10. Raw Row (Y axis) is the upper left hand corner Y position of the LRS 16x16 image array (i\_T0\_SA).

Comments:



Product Var Name i\_lrs\_RawCol

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Raw Column

Product Data Type: i2b (3, 10)

Total Bytes: 60

Product Units: pixels

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 495

Description: Raw column data from LRS SA-2 trackers 0-2, Samples 1-10. Raw column (X axis) is the upper left hand corner X position of the LRS 16x16 image array (i\_T0\_SA).

Comments:

Product Var Name i\_lrs\_TrkThr

Is element of: GLA04 LRS Main Record

Short Description: LRS Virtual Tracker Track Threshold

Product Data Type: i1b (3, 10)

Total Bytes: 30

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 2

Product Maximum: 255

Description: Threshold from LRS SA-2 trackers 0-2, Samples 1-10

Comments:

Product Var Name i\_lrs\_AcqThr

Is element of: GLA04 LRS Main Record

Short Description: LRS Acquisition Threshold

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 2

Product Maximum: 255

Description: LRS SA-2 Acquisition Threshold, Samples 1-10

## Comments:

Product Var Name i\_lrs\_FOVEdge

Is element of: GLA04 LRS Main Record

Short Description: LRS FOV Entrance Edge

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3

Description: LRS SA-2 FOV Entrance Edge, Samples 1-10

## Comments:

Product Var Name iF1LTRSRSC26\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: PRT, Face 1 LTR to SRS Temperature, Ch26

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Stellar Reference System (SRS) Temperature, Ch 26

## Comments:

Product Var Name i\_lrs\_IntTime

Is element of: GLA04 LRS Main Record

Short Description: LRS Integration Time

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: milliseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 40

Description: LRS SA-2 Integration Time, Samples 1-10

Comments:

Product Var Name i\_Irs\_FrmCtr

Is element of: GLA04 LRS Main Record

Short Description: LRS Frame Counter

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: LRS SA-2 Frame Counter, Samples 1-10

Comments:

Product Var Name i\_Irs\_tspare7

Is element of: GLA04 LRS Main Record

Short Description: LRS Spare 7

Product Data Type: i1b (4, 10)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: LRS SA-2 Spare 7, Samples 1-10

Product Var Name i\_Irs\_ccdtemp

Is element of: GLA04 LRS Main Record

Short Description: LRS SA-5 CCD Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -27316

Product Maximum: 23880

Description: Counts to degree C value in deg C = Counts/128 -273.16 The 273 changes K to C degrees Scale it by 100 on product output to keep .01 degrees

Comments:

Product Var Name i\_lrs\_lenscellt

Is element of: GLA04 LRS Main Record

Short Description: LRS SA-5 Lens Cell Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -27316

Product Maximum: 23880

Description:

Comments:

Product Var Name i\_trkr\_subject

Is element of: GLA04 LRS Main Record

Short Description: Tracker Subject

Product Data Type: i1b

Total Bytes: 1

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 63

Description: Tells what the tracker is tracking: 0=> Star Data, 1=> Laser Data, 2=> Collimated Data. The one byte looks like | 0 0 | T 2 | T 1 | T 0 | where T0 = Tracker 0, T 1 is tracker 1 and T2 is tracker 2. The MSB will be set to 00.

Comments:

Product Var Name i\_spare

Is element of: GLA04 LRS Main Record

Short Description: Spare

Product Data Type: i1b (3)

Total Bytes: 3

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: null

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA04\_LRS Spare.

Product Var Name i\_T0\_shot\_no

Is element of: GLA04 LRS Main Record

Short Description: shot number

Product Data Type: i4b

Total Bytes: 4

Product Units: NA

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: Shot number of the first frame.

Comments:

Product Var Name i\_T0\_frame

Is element of: GLA04 LRS Main Record

Short Description: T0 Frame number

Product Data Type: i2b (5)

Total Bytes: 10

Product Units: n/a

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Two byte word describing the frame.

Comments:

Product Var Name i\_T0\_SA

Is element of: GLA04 LRS Main Record

Short Description: LRS SA Virtual Tracker 0 Data

Product Data Type: i2b (256, 5)

Total Bytes: 2560

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: The image will be a 16 X 16 pixel image. The first word (2byte) in the PRAP data contains the frame number. It has been set to the same value as the second pixel so that automatic scaling in plots can work. Order of the data is: row 1 column 1 to 16; row2 column 1 to 16; ....; row 16 column 1 to 16. Column is X and Row is Y.

Comments:

Product Var Name i\_lrs\_spare2

Is element of: GLA04 LRS Main Record

Short Description: LRS Spare2

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: NA

Invalid Value/Flag: N/A

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: NA

Product Maximum: NA

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_T1\_shot\_no

Is element of: GLA04 LRS Main Record

Short Description: shot number

Product Data Type: i4b

Total Bytes: 4

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 200

Description: Shot number of the first frame.

## Comments:

Product Var Name i\_T1\_frame

Is element of: GLA04 LRS Main Record

Short Description: Tracker 1 Frame Number

Product Data Type: i2b (4)

Total Bytes: 8

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i2b

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Two byte word describing the frame

## Comments:

Product Var Name i\_T1\_SA

Is element of: GLA04 LRS Main Record

Short Description: LRS SA Virtual Tracker 1 Data

Product Data Type: i2b (256, 4)

Total Bytes: 2048

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: The image will be a 16 X 16 pixel image. The first word(2byte) in the PRAP data contains the frame number. It has been set to the same value as the second pixel so no automatic scaling will take place.

## Comments:

Product Var Name i\_T2\_shot\_no

Is element of: GLA04 LRS Main Record

Short Description: shot numbers

Product Data Type: i4b

Total Bytes: 4

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description:

Comments:

Product Var Name i\_T2\_frame

Is element of: GLA04 LRS Main Record

Short Description: Tracker2 Frame Number

Product Data Type: i2b

Total Bytes: 2

Product Units: counts

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: Two byte word describing the frame

Comments:

Product Var Name i\_T2\_SA

Is element of: GLA04 LRS Main Record

Short Description: LRS SA Virtual Tracker 2 Data

Product Data Type: i2b (256)

Total Bytes: 512

Product Units: null

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: The image will be a 16 X 16 pixel image. The first word(2byte) in the PRAP data contains the frame number. It has been set to the same value as the second pixel so no automatic scaling will take place.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a



Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <[a href='flags/i\\_timecorflg.pdf'](flags/i_timecorflg.pdf)> the PDF flag description in the next section for more details.

Comments:

Product Var Name iF2LTRSRSC27\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: PRT, Face 2 LTR to SRS Temperature, Ch27

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: PRT, Lidar Detector Pkg? Temperature, Ch 27

Comments:

Product Var Name i\_TsPMir\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Telescope Region 0 Primary Mirror Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Telescope Region 0 Primary Mirror

Comments:

Product Var Name i\_TsSMir\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: Telescope Region 1 Secondary Mirror Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1000

Product Maximum: 3000

Description: Telescope Region 1 Secondary Mirror

Comments:

Product Var Name i\_srs\_ff\_optio\_t

Is element of: GLA03 Main Record, GLA04 LRS Main Record

Short Description: SRS First Fold Optics Temperature

Product Data Type: i2b

Total Bytes: 2

Product Units: Celsius X 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 5000

Description: SRS First Fold Optics Temperature

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_samp\_time

Is element of: GLA04 GYRO Main Record

Short Description: Sample Time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The 10 times associated with the gyro data samples in the packet. Time in UTC seconds computed from corresponding VTCW converted by using GPS if available. The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time)

Comments:

Product Var Name i\_siru\_vtcw

Is element of: GLA04 GYRO Main Record

Short Description: SIRU VTCW

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Raw VTCW counts converted to seconds.

Comments:

Product Var Name i\_siru\_valdata

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Data Valid Word

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The SIRU Data Valid Word is composed of bit flags: Mode Valid (1/Valid, 0/Invalid); Gyro Scale Factor (1/High, 0/Low); Gyro A Angle Valid (1/Valid, 0/Invalid); Gyro B Angle Valid (1/Valid, 0/Invalid); Gyro C Angle Valid (1/Valid, 0/Invalid); Gyro D Angle Valid (1/Valid, 0/Invalid); Spare 1 (4 bits unused); Gyro A Rate Saturation (1/Saturated, 0/Normal); Gyro B Rate Saturation (1/Saturated, 0/Normal); Gyro C Rate Saturation (1/Saturated, 0/Normal); Gyro D Rate Saturation (1/Saturated, 0/Normal); Heater Power Status (1/Off or Error, 0/Normal); Spare 2 (1 bit unused). One flag word per sample; 10 samples per second.

Please see [flags/i\\_siru\\_valdata.pdf](flags/i_siru_valdata.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_siru\_AIA

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Gyro A Integrated Angle

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Arc-Seconds\*20

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3600

Description: 10 samples per second.

Comments:

Product Var Name i\_siru\_BIA

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Gyro B Integrated Angle

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Arc-Seconds\*20

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3600

Description: 10 samples per second.

Comments:

Product Var Name i\_siru\_CIA

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Gyro C Integrated Angle

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Arc-Seconds\*20

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3600

Description: 10 samples per second.

Comments:

Product Var Name i\_siru\_DIA

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Gyro D Integrated Angle

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Arc-Seconds\*20

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 3600

Description: 10 samples per second.

Comments:

Product Var Name i\_siru\_ttag

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Time Tag (free-run bin clock)

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4194240

Description: 10 samples per second.

Comments:

Product Var Name i\_siru\_config

Is element of: GLA04 GYRO Main Record

Short Description: SIRU Configuration Word, Sample 1

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: n/a

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: The SIRU Configuration Word is composed of bit flags: Gyro A Status (1/Active, 0/Inactive); Gyro B Status (1/Active, 0/Inactive); Gyro C Status (1/Active, 0/Inactive); Gyro D Status (1/Active, 0/Inactive); CPU/HCM Channel 1 Status (1/Active, 0/Inactive); CPU/HCM Channel 2 Status (1/Active, 0/Inactive); Power Supply 1 Status (1/Active, 0/Inactive); Power Supply 2 Status (1/Active, 0/Inactive); Reserved (4 bits); Spare 3 (4 bits unused). One flag word per sample; 10 samples per second.

Please see [the PDF flag description in the next section](\"flags/i_siru_config.pdf\") for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see [the PDF flag description in the next section](\"the PDF flag description in the next section\") for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href="flags/i\_timecorflg.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_gyro\_spare1

Is element of: GLA04 GYRO Main Record

Short Description: Gyro Spare1

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000



Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole

number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_samp\_time

Is element of: GLA04 IST Main Record

Short Description: Sample Time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: gi\_invalid\_i4b

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The 10 times of the IST data as computed from the VTCW converted by using GPS if available and time offsets to the GLAS laser 10 hertz signal (every fourth fire cmd). The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time).

Comments:

Product Var Name i\_shot\_time

Is element of: GLA04 IST Main Record

Short Description: Shot times

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: The time for each of the 10 laser shots based on alignment with GLA01 using the GPS time if available. The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time)

Comments:

Product Var Name i\_shot\_ctr

Is element of: GLA04 IST Main Record

Short Description: shot numbers

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: counts

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description: Shot numbers for the 10 laser fire commands associated with the IST data.

Comments:

Product Var Name i\_ist\_vtcw

Is element of: GLA04 IST Main Record

Short Description: IST VTCW Time Tag

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Raw VTCW counts converted to seconds.

Comments:

Product Var Name i\_ist\_timetag

Is element of: GLA04 IST Main Record

Short Description: IST Time Tag

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: IST SA-8 Time Tag, Sample 1-10. The time increment to GLAS 10 Hz pulse.

Comments:

Product Var Name i\_ist\_msginc

Is element of: GLA04 IST Main Record

Short Description: IST Message Incomplete Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: IST SA-8 Message Incomplete Flag, Sample 1-10

Comments:

Product Var Name i\_ist\_RollCt

Is element of: GLA04 IST Main Record

Short Description: IST Time Tag Rollover Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 15

Description: IST SA-8 Time Tag Rollover Count, Sample 1-10

Comments:

Product Var Name i\_ist\_TkrMode

Is element of: GLA04 IST Main Record

Short Description: IST Tracker Mode Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 7

Description: IST SA-8 Tracker Mode Status, Sample 1-10

Product Var Name i\_ist\_tspare1

Is element of: GLA04 IST Main Record

Short Description: IST Spare 1

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: IST SA-8 Spare 1, Sample 1-10

Product Var Name i\_ist\_DiagStat

Is element of: GLA04 IST Main Record

Short Description: IST Diagnostic Sub-Mode Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: IST SA-8 Diagnostic Sub-Mode Status, Sample 1-10

Comments:

Product Var Name i\_ist\_LastPCmd

Is element of: GLA04 IST Main Record

Short Description: IST Last Processed Command ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Last Processed Command ID, Sample 1-10

Comments:

Product Var Name i\_ist\_VTkrSt

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Trackers State

Product Data Type: i1b (6, 10)

Total Bytes: 60

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: State of IST SA-8 Virtual Trackers 0-5 for Samples 1-10. For each tracker byte value indicates the state. Values are 0=Offline, 1=Standby, 2=Acq1, 3=Acq2, 4=RedAcq1, 5=RedAcq2, 6=Handoff1, 7=Handoff2, 8=Handoff3, 9=Handoff4, 10=Handoff5, 11=Track, 12=U12 bad, 13=U13 bad, 14=U14 bad, 15=AwaitAcq. Tracker 0 starts at byte 1.

Comments:

Product Var Name i\_ist\_stat

Is element of: GLA04 IST Main Record

Short Description: IST SA-8 Status

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Bit Flags. Bit 7 = Fault Detection Summary (0/Clear 1/Set); Bit 6 = Cold Boot Indicator (0/Clear 1/Set); Bit 5 = Time Mark Received (0/Clear 1/Set); Bit 4 = Software Reset Event (0/Clear 1/Set); Bit 3 =

Bright Object Event (0/External 1/Internal); Bit 2 = Invalid Command (0/Clear 1/Set); Bit 1 = TEC Enbl/Dsbl Status (0/Dsbl 1/Enbl); Bit 0 = Command Ignored Flag (0/Clear 1/Set)

Comments:

Product Var Name i\_ist\_TimeMark

Is element of: GLA04 IST Main Record

Short Description: IST Time Mark ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Time Mark ID, Sample 1-10

Comments:

Product Var Name i\_ist\_CamID

Is element of: GLA04 IST Main Record

Short Description: IST Camera ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Camera ID, Sample 1-10

Comments:

Product Var Name i\_ist\_swVID

Is element of: GLA04 IST Main Record

Short Description: IST Software Version ID

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: IST SA-8 Software Version ID, Sample 1-10

Comments:

Product Var Name i\_ist\_flag

Is element of: GLA04 IST Main Record

Short Description: IST Flag

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 255

Description: IST Flag Byte. Please see [flags/i\\_ist\\_flag.pdf](\"#\") the PDF flag description in the next section for more details.

Comments:

Product Var Name l\_ist\_spare1

Is element of: GLA04 IST Main Record

Short Description: IST Spare1

Product Data Type: i1b (2)

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_Vtstarvalid

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Star Valid

Product Data Type: i1b (6, 10)

Total Bytes: 60

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Star Valid Flag for IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_VTEEnergy

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Encircled Energy

Product Data Type: i2b (6, 10)

Total Bytes: 120

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32678

Description: Encircled Energy for IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_VTBgBias

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Bckgrnd Bias

Product Data Type: i2b (6, 10)

Total Bytes: 120

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 1024

Description: Backgrnd Bias for IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_VTStarMag

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Star Magnitude

Product Data Type: i2b (6, 10)



Total Bytes: 120

Product Units: star magnitude\*10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 63

Description: Star Magnitude from IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_VTBoreH

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Boresight H

Product Data Type: i4b (6, 10)

Total Bytes: 240

Product Units: Arc-seconds\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1700000

Product Maximum: 1700000

Description: Boresight H from IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_VTBoreV

Is element of: GLA04 IST Main Record

Short Description: IST Virtual Tracker Boresight V

Product Data Type: i4b (6, 10)

Total Bytes: 240

Product Units: Arc-seconds\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1700000

Product Maximum: 1700000

Description: Boresight V from IST SA-8 Virtual Trackers 0 - 5, Samples 1-10

Comments:

Product Var Name i\_ist\_FocLngth

Is element of: GLA04 IST Main Record

Short Description: IST Effective Focal Length

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microns \* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 6535500

Description: IST SA-8 Effective Focal Length, Samples 1-10

Comments:

Product Var Name i\_istTimCofInt

Is element of: GLA04 IST Main Record

Short Description: IST Time to Center of Integration

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 131070000

Description: IST SA-29 Time to Center of Integration, Samples 1-10

Comments:

Product Var Name i\_ist\_BoreCol

Is element of: GLA04 IST Main Record

Short Description: IST Boresight Column

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 390000

Description: IST SA-29 Boresight Column, Samples 1-10

Comments:

Product Var Name i\_ist\_BoreRow

Is element of: GLA04 IST Main Record

Short Description: IST Boresight Row

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 390000

Description: IST SA-29 Boresight Row, Samples 1-10

Comments:

Product Var Name i\_ist\_CCDTemp

Is element of: GLA04 IST Main Record

Short Description: IST CCD Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Celsius\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -27316

Product Maximum: 23880

Description: IST SA-29 CCD Temperature, Samples 1-10

Comments:

Product Var Name i\_istLensCellT

Is element of: GLA04 IST Main Record

Short Description: IST Lens Cell Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Celsius\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -27316

Product Maximum: 23880

Description: IST SA-29 Lens Cell Temperature, Samples 1-10

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href='flags/i\_timecorflg.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_ist\_spare2

Is element of: GLA04 IST Main Record

Short Description: IST Spare2

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments: GLA04\_ist spare2.

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_bst1\_samp\_time

Is element of: GLA04 BST Main Record

Short Description: BST1 Sample Time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The time of the ten BST1 data. This time is computed using the VTCW counts and converted to seconds using GPS if available.

Comments:

Product Var Name i\_bst1\_vtcw

Is element of: GLA04 BST Main Record

Short Description: BST1 VTCW Time Tag

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: null

Description: BST1 VTCW counts converted to seconds.

Comments:

Product Var Name i\_bst1\_pchstat

Is element of: GLA04 BST Main Record

Short Description: BST1 Patch Execution Status

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 0

Description: 0 = No patches. 10 samples per second.

Comments:

Product Var Name i\_bst1\_datlat

Is element of: GLA04 BST Main Record

Short Description: BST1 Data Latency

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4194240

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_sw1

Is element of: GLA04 BST Main Record

Short Description: BST1 Status Word 1

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST1 Status Word 1 is composed of bit flags: Position Uncalibrated (0/CalEnbl, 1/CalDsbl); Intensity Uncalibrated (0/CalEnbl, 1/CalDsbl); BITE Star On (0/NoBITE, 1/BITEOn); Background High (0/OK, 1/High); RAM Fail (0/OK, 1/Error); ROM Fail (0/OK, 1/Error); Star 5 Invalid (0/OK, 1/Invalid); Star 4 Invalid (0/OK, 1/Invalid); Star 3 Invalid (0/OK, 1/Invalid); Star 2 Invalid (0/OK, 1/Invalid); Star 1 Invalid (0/OK, 1/Invalid); Star 5 Track (0/NoTrack, 1/Track); Star 4 Track (0/NoTrack, 1/Track); Star 3 Track (0/NoTrack, 1/Track); Star 2 Track (0/NoTrack, 1/Track); Star 1 Track (0/NoTrack, 1/Track). One status word per sample; 10 samples per second. Please see <a href='\"/i\_bst\_sw1.pdf\"'>the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_bst1\_sw2

Is element of: GLA04 BST Main Record

Short Description: BST1 Status Word 2

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST1 Status Word 2 is composed of bit flags: Star 5 Directed Search (0/NoSrch, 1/Search); Star 4 Directed Search (0/NoSrch, 1/Search); Star 3 Directed Search (0/NoSrch, 1/Search); Star 2 Directed Search (0/NoSrch, 1/Search); Star 1 Directed Search (0/NoSrch, 1/Search); Full Field Search (0/NoSrch, 1/Search); Calibration Override (0/NoOverride, 1/Override); Unsync (0/OK, 1/Unsync); Download (0/NoDnld, 1/Dnld); Stack Error (0/OK, 1/Error); Smoothed Raw Data (0/NoSmooth, 1/Smoothed); Watchdog Timeout (0/OK, 1/Timeout); Data Error (0/OK, 1/Error); Data Upset (0/OK, 1/Upset); RAM Execution (0/ROM, 1/RAM); Reset (0/Clear, 1/Reset). One status word per sample; 10 samples per second. Please see [flags/i\\_bst\\_sw2.pdf](flags/i_bst_sw2.pdf) the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_bst1\_mctr

Is element of: GLA04 BST Main Record

Short Description: BST1 Message Counter

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_recctr

Is element of: GLA04 BST Main Record

Short Description: BST1 Command Received Counter

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes



Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_rejctr

Is element of: GLA04 BST Main Record

Short Description: BST1 Command Rejected Counter

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second

Comments:

Product Var Name i\_bst1\_starX

Is element of: GLA04 BST Main Record

Short Description: BST1 Star Position X

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Arc-SecondsX100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Position X of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst1\_starY

Is element of: GLA04 BST Main Record

Short Description: BST1 Star Position Y

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Arc-SecondsX100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Position Y of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst1\_starInt

Is element of: GLA04 BST Main Record

Short Description: BST1 Star Intensity

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Magnitude\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -250000

Product Maximum: 250000

Description: Intensity of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst1\_ccdtemp

Is element of: GLA04 BST Main Record

Short Description: BST1 CCD Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Celsius\* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32677

Product Maximum: 32678

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_bptemp

Is element of: GLA04 BST Main Record

Short Description: BST1 Baseplate Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Celsius\* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32677

Product Maximum: 32678

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_lenstmp

Is element of: GLA04 BST Main Record

Short Description: BST1 Lens Temperature

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: Celsius\* 100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32677

Product Maximum: 32678

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_8V

Is element of: GLA04 BST Main Record

Short Description: BST1 +8 Volt Supply

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: Volt \* 10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_n9V

Is element of: GLA04 BST Main Record

Short Description: BST1 -9 Volt Supply

Product Data Type: i1b (10)  
Total Bytes: 10  
Product Units: Volt \* 10  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -127  
Product Maximum: 127  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst1\_4V  
Is element of: GLA04 BST Main Record  
Short Description: BST1 +4 Volt Supply  
Product Data Type: i1b (10)  
Total Bytes: 10  
Product Units: Volt \* 10  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -127  
Product Maximum: 127  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst1\_n5V  
Is element of: GLA04 BST Main Record  
Short Description: BST1 -5 Volt Supply  
Product Data Type: i1b (10)  
Total Bytes: 10  
Product Units: Volt \* 10  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -127  
Product Maximum: 127  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst1\_BG

Is element of: GLA04 BST Main Record

Short Description: BST1 Background Reading

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32767

Product Maximum: 32767

Description: 10 samples per second.

Comments: From Paul Woznick: The background count should be treated as signed. A negative count means that the tracker has been light saturated for a longer period of time and because the reference voltage is dynamic, can result in a negative output.

Product Var Name i\_bst1\_srchct

Is element of: GLA04 BST Main Record

Short Description: BST1 Full Field Search Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst1\_Fact

Is element of: GLA04 BST Main Record

Short Description: BST1 False Alarms Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

## Comments:

Product Var Name i\_bst1\_sernum

Is element of: GLA04 BST Main Record

Short Description: BST1 Serial Number

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

## Comments:

Product Var Name i\_bst1\_swver

Is element of: GLA04 BST Main Record

Short Description: BST1 Software Revision Code

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: One revision code per sample; 10 samples per second.

## Comments:

Product Var Name i\_bst1\_cancode

Is element of: GLA04 BST Main Record

Short Description: BST1 Cancel Code Word

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST1 Cancel Code Word; 3 bits for each star (1-5); bit 15 is spare. The flag values are: 0/NoTerm, 1/Overlap, 2/NoFOV, 3/TooDark, 4/HotPixel, 5/ColumnDefect, 6/BreakTrack, 7/Dropped. Star 1 flag starts at bit 0. One code word per sample; 10 samples per second.

Please see [the PDF flag description in the next section](flags/i_bst_cancode.pdf) for more details.

Comments:

Product Var Name i\_bst\_spare1

Is element of: GLA04 BST Main Record

Short Description: BST Spare1

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_bst2\_samp\_time

Is element of: GLA04 BST Main Record

Short Description: BST2 Sample Time

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 2147483647

Description: The time of the ten BST2 data. This time is computed using the VTCW counts and converted to seconds using GPS if available.

Comments:

Product Var Name i\_bst2\_vtcw

Is element of: GLA04 BST Main Record

Short Description: BST2 VTCW Time Tag

Product Data Type: i4b (2, 10)

Total Bytes: 80

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: null

Description: BST2 raw VTCW converted to seconds.

Comments:

Product Var Name i\_bst2\_pchstat

Is element of: GLA04 BST Main Record

Short Description: BST2 Patch Execution Status

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 0

Description: 0 = No patches. 10 samples per second.

Comments:

Product Var Name i\_bst2\_datlat

Is element of: GLA04 BST Main Record

Short Description: BST2 Data Latency

Product Data Type: i4b (10)

Total Bytes: 40

Product Units: Microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 4194240

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_sw1

Is element of: GLA04 BST Main Record

Short Description: BST2 Status Word 1



Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST2 Status Word 1 is composed of bit flags: Position Uncalibrated (0/CalEnbl, 1/CalDsbl); Intensity Uncalibrated (0/CalEnbl, 1/CalDsbl); BITE Star On (0/NoBITE, 1/BITEOn); Back;ground High (0/OK, 1/High); RAM Fail (0/OK, 1/Error); ROM Fail (0/OK, 1/Error); Star 5 Invalid (0/OK, 1/Invalid); Star 4 Invalid (0/OK, 1/Invalid); Star 3 Invalid (0/OK, 1/Invalid); Star 2 Invalid (0/OK, 1/Invalid); Star 1 Invalid (0/OK, 1/Invalid); Star 5 Track (0/NoTrack, 1/Track); Star 4 Track (0/NoTrack, 1/Track); Star 3 Track (0/NoTrack, 1/Track); Star 2 Track (0/NoTrack, 1/Track); Star 1 Track (0/NoTrack, 1/Track). One status word per sample; 10 samples per second. Please see <a href='flags/i\_bst\_sw1.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_bst2\_sw2

Is element of: GLA04 BST Main Record

Short Description: BST2 Status Word 2

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST2 Status Word 2 is composed of bit flags: Star 5 Directed Search (0/NoSrch, 1/Search); Star 4 Directed Search (0/NoSrch, 1/Search); Star 3 Directed Search (0/NoSrch, 1/Search); Star 2 Directed Search (0/NoSrch, 1/Search); Star 1 Directed Search (0/NoSrch, 1/Search); Full Field Search (0/NoSrch, 1/Search); Calibration Override (0/NoOverride, 1/Override); Unsync (0/OK, 1/Unsync); Download (0/NoDnld, 1/Dnld); Stack Error (0/OK, 1/Error); Smoothed Raw Data (0/NoSmooth, 1/Smoothed); Watchdog Timeout (0/OK, 1/Timeout); Data Error (0/OK, 1/Error); Data Upset (0/OK, 1/Upset); RAM Execution (0/ROM, 1/RAM); Reset (0/Clear, 1/Reset). One status word per sample; 10 samples per second. Please see <a href='flags/i\_bst\_sw2.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_bst2\_mctr

Is element of: GLA04 BST Main Record

Short Description: BST2 Message Counter

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_recctr

Is element of: GLA04 BST Main Record

Short Description: BST2 Command Received Counter

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_rejctr

Is element of: GLA04 BST Main Record

Short Description: BST2 Command Rejected Counter

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_starX

Is element of: GLA04 BST Main Record

Short Description: BST2 Star Position X

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Arc-Seconds\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Position X of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst2\_starY

Is element of: GLA04 BST Main Record

Short Description: BST2 Star Position Y

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Arc-Seconds\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 360000

Description: Position Y of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst2\_starInt

Is element of: GLA04 BST Main Record

Short Description: BST2 Star Intensity

Product Data Type: i4b (5, 10)

Total Bytes: 200

Product Units: Magnitude\*100

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -250000

Product Maximum: 250000

Description: Intensity of 5 stars at 10 samples per second.

Comments:

Product Var Name i\_bst2\_ccdtemp

Is element of: GLA04 BST Main Record

Short Description: BST2 CCD Temperature

Product Data Type: i2b (10)  
Total Bytes: 20  
Product Units: Celsius\* 100  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -32677  
Product Maximum: 32678  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst2\_bptemp  
Is element of: GLA04 BST Main Record  
Short Description: BST2 Baseplate Temperature  
Product Data Type: i2b (10)  
Total Bytes: 20  
Product Units: Celsius\* 100  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -32677  
Product Maximum: 32678  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst2\_lenstmp  
Is element of: GLA04 BST Main Record  
Short Description: BST2 Lens Temperature  
Product Data Type: i2b (10)  
Total Bytes: 20  
Product Units: Celsius\* 100  
Invalid Value/Flag: i\_APID\_AvFlg  
Is Correction Flag?: NA  
Is Unsigned?: No  
Product Minimum: -32677  
Product Maximum: 32678  
Description: 10 samples per second.  
Comments:

Product Var Name i\_bst2\_8V

Is element of: GLA04 BST Main Record

Short Description: BST2 +8 Volt Supply

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: Volt \* 10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_n9V

Is element of: GLA04 BST Main Record

Short Description: BST2 -9 Volt Supply

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: Volt \* 10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_4V

Is element of: GLA04 BST Main Record

Short Description: BST2 +4 Volt Supply

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: Volt \* 10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_n5V

Is element of: GLA04 BST Main Record

Short Description: BST2 -5 Volt Supply

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: Volt \* 10

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_BG

Is element of: GLA04 BST Main Record

Short Description: BST2 Background Reading

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -32767

Product Maximum: 32767

Description: 10 samples per second.

Comments: From Paul Woznick: The background count should be treated as signed. A negative count means that the tracker has been light saturated for a longer period of time and because the reference voltage is dynamic, can result in a negative output.

Product Var Name i\_bst2\_srchct

Is element of: GLA04 BST Main Record

Short Description: BST2 Full Field Search Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second

.Comments:

Product Var Name i\_bst2\_Fact

Is element of: GLA04 BST Main Record

Short Description: BST2 False Alarms Count

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_sernum

Is element of: GLA04 BST Main Record

Short Description: BST2 Serial Number

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: 10 samples per second.

Comments:

Product Var Name i\_bst2\_swver

Is element of: GLA04 BST Main Record

Short Description: BST2 Software Revision Code

Product Data Type: i1b (10)

Total Bytes: 10

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 255

Description: One revision code per sample; 10 samples per second.

Comments:

Product Var Name i\_bst2\_cancode

Is element of: GLA04 BST Main Record

Short Description: BST2 Cancel Code Word

Product Data Type: i2b (10)

Total Bytes: 20

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 65535

Description: BST2 Cancel Code Word; 3 bits for each star (1-5); bit 15 is spare. The flag values are: 0/NoTerm, 1/Overlap, 2/NoFOV, 3/TooDark, 4/HotPixel, 5/ColumnDefect, 6/BreakTrack, 7/Dropped. Star 1 flag starts at bit 0. One code word per sample; 10 samples per second.

Please see <a href='flags/i\_bst\_cancode.pdf'> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record , GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg



Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see <a href="flags/i\_timecorflg.pdf"> the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_bst\_spare2

Is element of: GLA04 BST Main Record

Short Description: BST Spare2

Product Data Type: i1b (6)

Total Bytes: 6

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

Product Var Name i\_rec\_ndx

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: GLAS Record Index

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Unique index that relates this record to the corresponding record(s) in each GLAS data product.

Comments:

Product Var Name i\_UTCTime

Is element of: GLA01 Long Waveform Record, GLA01 Main Record, GLA01\_Short\_Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: Transmit Time of First Shot in frame in J2000

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: The transmit time of the first shot in the 1 second frame measured as 'UTC seconds' elapsed since Jan 1 2000 12:00:00 UTC. This time has been derived from the GPS time accounting for leap seconds. The first item is the whole number of seconds; the second item is the fractional part in microseconds.

Comments: This is not the ground bounce time, but the transmit time.

Product Var Name i\_samp\_time

Is element of: GLA04 SCPA Main Record

Short Description: Sample time

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds microseconds

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: NA

Product Minimum: 0

Product Maximum: 2147483647

Description: The time for the s/c data based on the GPS time latched to VTCW. The first item is the whole number of seconds since J2000; the second item is the fractional part in microseconds. (In UTC J2000 time)

Comments:

Product Var Name i\_scpa\_vtcw

Is element of: GLA04 SCPA Main Record

Short Description: S/C Data VTCW Time Tag

Product Data Type: i4b (2)

Total Bytes: 8

Product Units: seconds, microseconds

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 2147483647

Description: Raw VTCW counts converted to seconds

Comments:

Product Var Name i\_CFA\_Q1

Is element of: GLA04 SCPA Main Record

Short Description: Control Frame Att Quaternion Q1

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1100000

Product Maximum: 1100000

Description: The spacecraft control frame attitude quaternion 1 from the ADCS Data.

Comments:

Product Var Name i\_CFA\_Q2

Is element of: GLA04 SCPA Main Record

Short Description: Control Frame Att Quaternion Q2

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1100000

Product Maximum: 1100000

Description: The spacecraft control frame attitude quaternion 2 from the ADCS Data.

Comments:

Product Var Name i\_CFA\_Q3

Is element of: GLA04 SCPA Main Record

Short Description: Control Frame Att Quaternion Q3

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1100000

Product Maximum: 1100000

Description: The spacecraft control frame attitude quaternion 3 from the ADCS Data.

Comments:

Product Var Name i\_CFA\_Q4

Is element of: GLA04 SCPA Main Record

Short Description: Control Frame Att Quaternion Q4

Product Data Type: i4b

Total Bytes: 4

Product Units: N/A

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1100000

Product Maximum: 1100000

Description: The spacecraft control frame attitude quaternion 4 from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_PosX

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Position X

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -8169500

Product Maximum: 8169500

Description: The spacecraft's next ECI Orbital Position X from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_PosY

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Position Y

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -8169500

Product Maximum: 8169500

Description: The spacecraft's next ECI Orbital Position Y from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_PosZ

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Position Z

Product Data Type: i4b

Total Bytes: 4

Product Units: meters

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -8169500

Product Maximum: 8169500

Description: The spacecraft's next ECI Orbital Position Z from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_VelX

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Velocity X

Product Data Type: i4b

Total Bytes: 4

Product Units: cm/sec

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1045696

Product Maximum: 1045696

Description: The spacecraft's next ECI Orbital Velocity X from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_VelY

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Velocity Y

Product Data Type: i4b

Total Bytes: 4

Product Units: cm/sec

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1045696

Product Maximum: 1045696

Description: The spacecraft's next ECI Orbital Velocity Y from the ADCS Data.

Comments:

Product Var Name i\_ECIOrb\_VelZ

Is element of: GLA04 SCPA Main Record

Short Description: Next ECI Orbital Velocity Z

Product Data Type: i4b

Total Bytes: 4

Product Units: cm/sec

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -1045696

Product Maximum: 1045696

Description: The spacecraft's next ECI Orbital Velocity Z from the ADCS Data.

Comments:

Product Var Name i\_SA\_Pos1

Is element of: GLA04 SCPA Main Record

Short Description: Calculated SA 1 Position

Product Data Type: i4b

Total Bytes: 4

Product Units: radians\*1.0E+6

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -65536

Product Maximum: 65536

Description: The spacecraft calculated SA 1 Position from the ADCS Data.

Comments:

Product Var Name i\_SA\_Pos2

Is element of: GLA04 SCPA Main Record

Short Description: Calculated SA 2 Position

Product Data Type: i4b

Total Bytes: 4

Product Units: radians\*1.0E+6

Invalid Value/Flag: i\_APID\_AvFlg

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -65536

Product Maximum: 65536

Description: The spacecraft calculated SA 2 Position from the ADCS Data.

Comments:

Product Var Name i\_gps\_latch

Is element of: GLA04 SCPA Main Record

Short Description: GPS Latched VTCW

Product Data Type: i2b (3)

Total Bytes: 6

Product Units: microseconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description:

Comments:

Product Var Name i\_gps\_time

Is element of: GLA04 SCPA Main Record

Short Description: GPS Time of Current Solution

Product Data Type: i4b

Total Bytes: 4

Product Units: seconds

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: null

Product Maximum: null

Description:

Comments:

Product Var Name i\_SA\_CntrFlg1

Is element of: GLA04 SCPA Main Record

Short Description: SA 1 Autonomous Control Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Points indicate whether or not solar array articulation is enabled or inhibited.

Comments:

Product Var Name i\_SA\_CntrFlg2

Is element of: GLA04 SCPA Main Record

Short Description: SA 2 Autonomous Control Flag

Product Data Type: i1b

Total Bytes: 1

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: Yes

Product Minimum: 0

Product Maximum: 1

Description: Points indicate whether or not solar array articulation is enabled or inhibited.

Comments:

Product Var Name i\_APID\_AvFlg

Is element of: GLA01 Main Record, GLA02 Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record



Short Description: APID Data Availability Flag

Product Data Type: i1b (8)

Total Bytes: 8

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: -127

Product Maximum: 127

Description: Flag indicating which packets (APIDs) for each second are available missing, or filled. APID 19 is broken down further into Altimeter Digitizer, Photon Counter, Cloud Digitizer, GPS/DEM, and C&T sections.

Please see the PDF flag description in the next section for more details.

Comments:

Product Var Name i\_timecorflg

Is element of: GLA01 Main Record, GLA02 Record, GLA03 Main Record, GLA04 BST Main Record, GLA04 GYRO Main Record, GLA04 IST Main Record, GLA04 LPA Main Record, GLA04 LRS Main Record, GLA04 SCPA Main Record, GLA05 record, GLA06 record, GLA07 Record, GLA08 Record, GLA09 Record, GLA10 record, GLA11 Record, GLA12 Record, GLA13 Record, GLA14 Record, GLA15 Record

Short Description: time correction flag

Product Data Type: i2b

Total Bytes: 2

Product Units: N/A

Invalid Value/Flag: No

Is Correction Flag?: No

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 32767

Description: Indicates what instrument or bias corrections were applied to the times on this record. Please see [the PDF flag description in the next section](flags/i_timecorflg.pdf) for more details.

Comments:

Product Var Name i\_scpa\_spare1

Is element of: GLA04 SCPA Main Record

Short Description: SCPA Spare 1

Product Data Type: i1b (4)

Total Bytes: 4

Product Units: n/a

Invalid Value/Flag: No

Is Correction Flag?: NA

Is Unsigned?: No

Product Minimum: 0

Product Maximum: 0

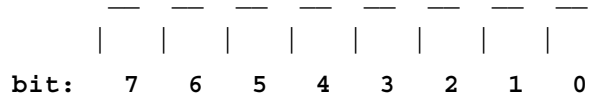
Description: This variable consists of spare bytes reserved for architectural consistency of the data file. It contains no meaningful information.

Comments:

## Flags

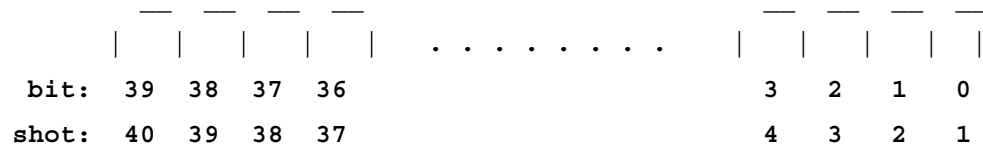
### 5.1 Flag Design Philosophy

GSAS flag design is governed by a consistent design philosophy. Per big-endian convention, bits are numbered right to left starting at 0. E.g., a byte has the following bit numbers:

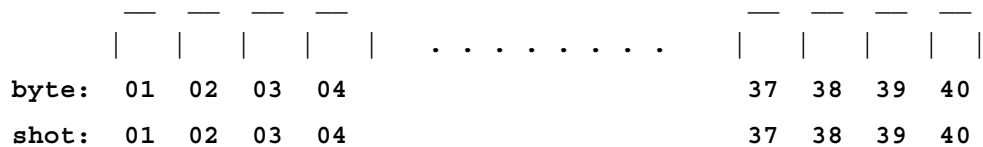


However, arrays of bytes are numbered left to right starting at 1. The direction from which shots are incremented depend if the flag is a byte flag or bit flag. Byte flags increment from left to right, bit flags increment from right to left. This follows the "natural" big endian ordering scheme. E.g.:

BIT flags increment from right to left:



BYTE flags increment from left to right:



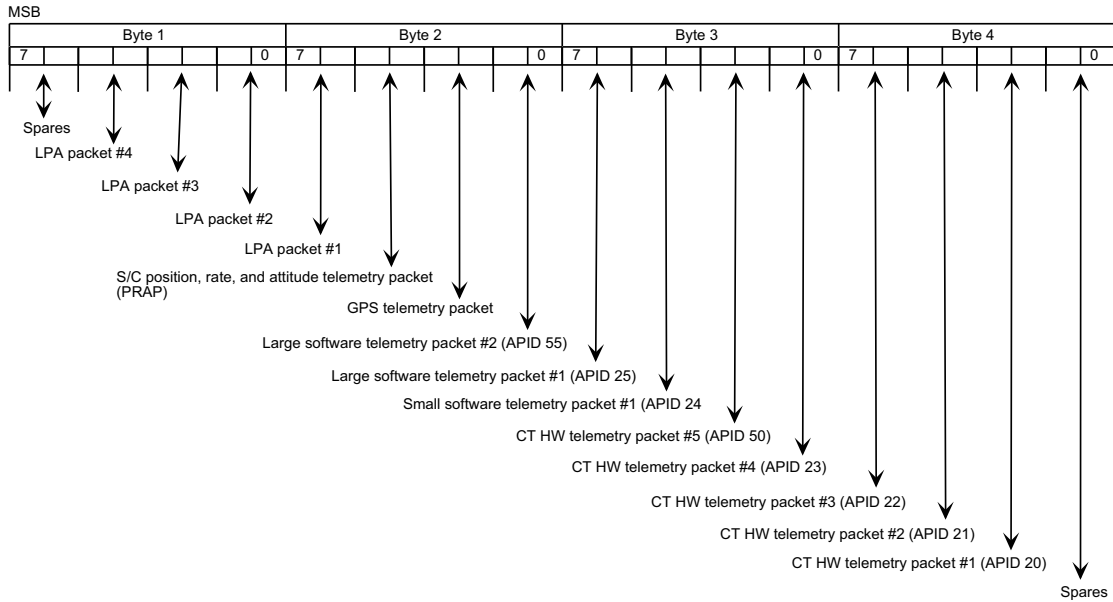
The following section contains detailed descriptions of each flag found in the GLAS standard data products. The descriptions are ordered alphabetically.

### 5.2 PDF Flag Descriptions

**i\_APID\_AvFig [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag**

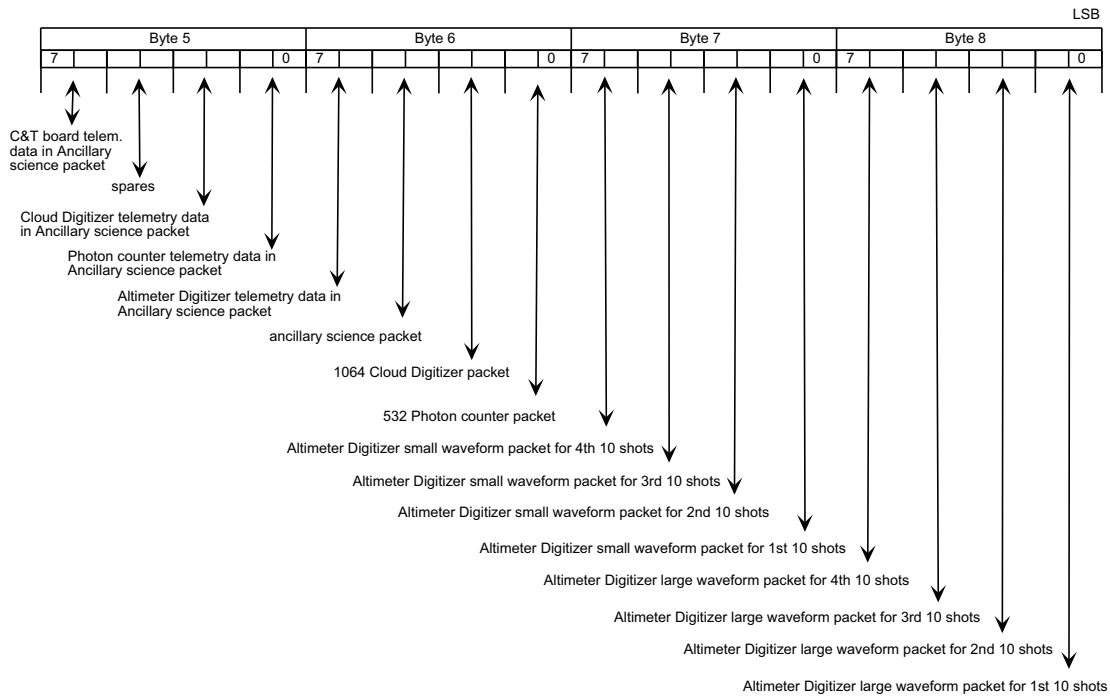
Page 1 of 2

2 bit sets of values; 0= present, 1=filled at EDOS, 2=never received - ISIPS filled

**i\_APID\_AvFig [1/sec for GLA01, 02, 04-07, 12-15], [1/16 sec for GLA03]: APID Data Availability Flag (continued)**

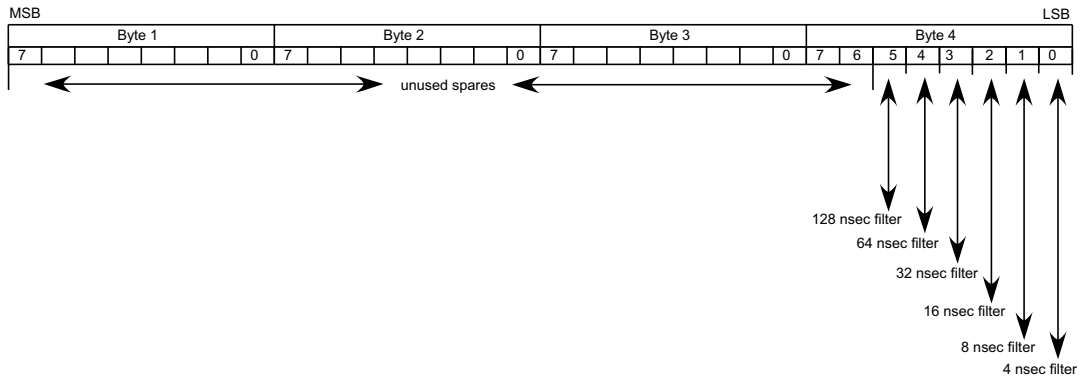
Page 2 of 2

2 bit sets of values; 0= present, 1=filled at EDOS, 2=never received - ISIPS filled

**Figure 5-1 APID Data Availability Flag**

**i\_FiltNumMask** [GLA01\_Main]: Filter Section Mask

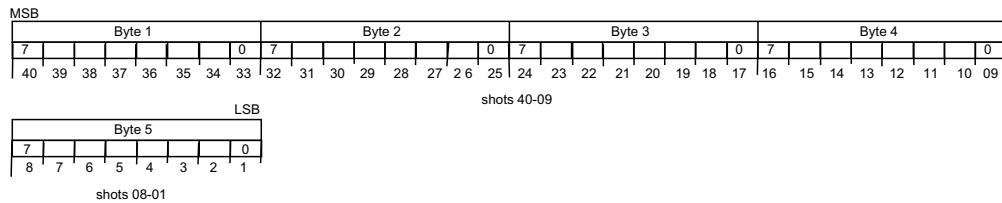
1 bit set of values: 0 = not selectable, 1 = selectable



**Figure 5-2 Filter Section Mask**

**i\_GainShiftFlag** [1/sec for GLA01\_main]: Gain Shift Flag; One flag per shot; indicates if the gain has been shifted for the corresponding measurement. 1-bit flags, 40/second.

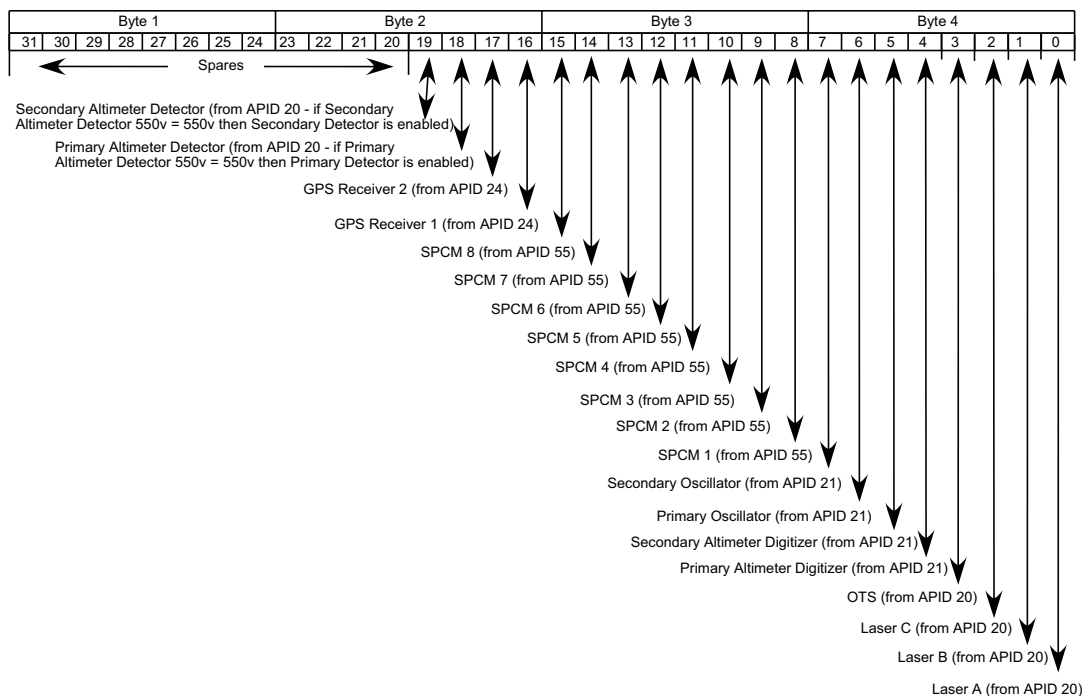
0=Gain has been shifted (valid)  
1=Gain has not been shifted (potentially invalid)



**Figure 5-3 Gain Shift Flag**

**i\_InstState** [GLA01\_main]: Instrument State Flag

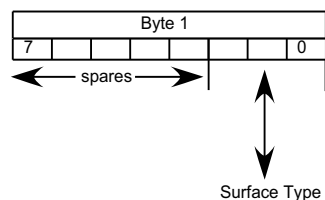
1 bit set of values: 0 = Disabled/Off, 1 = Enabled/On



**Figure 5-4 Instrument State Flag**

**i\_ObSurfType** [GLA01]: Surface Type

1 byte set of values: 0 = ocean & no ice, 1 = land & no ice, 2 = ocean & ice, 3 = land & ice



**Figure 5-5 Surface Type**

i\_OrbFlag [1/sec for GLA01, 02, 05-15]: Orbit Flag

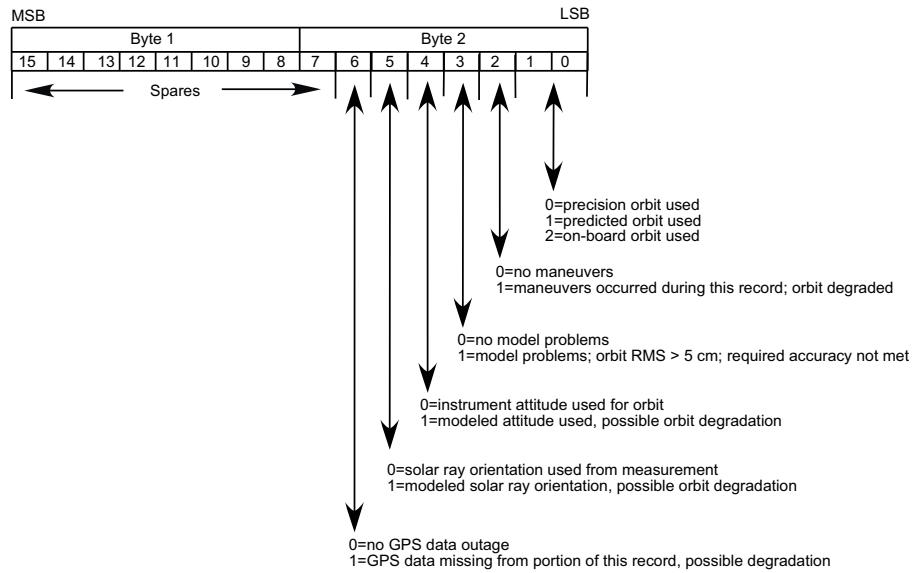


Figure 5-6 Orbit Flag

i\_RngSrc\_Flag [GLA01\_Main]:Range Data Source Flag

1 byte set of values: 0 = s/c time and position packet, 1 = uplinked DEM bytes, 2 = uplinked Rmin/Rmax

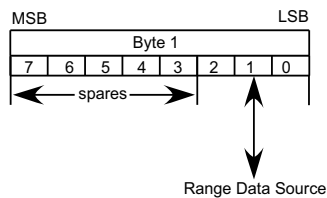
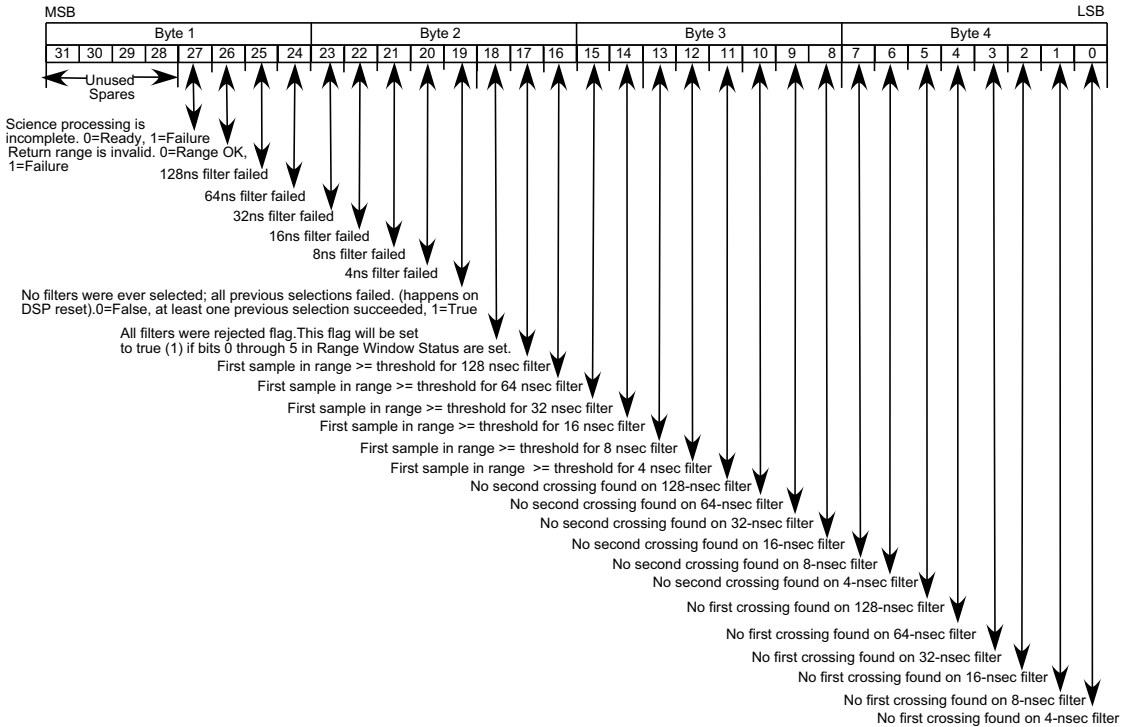


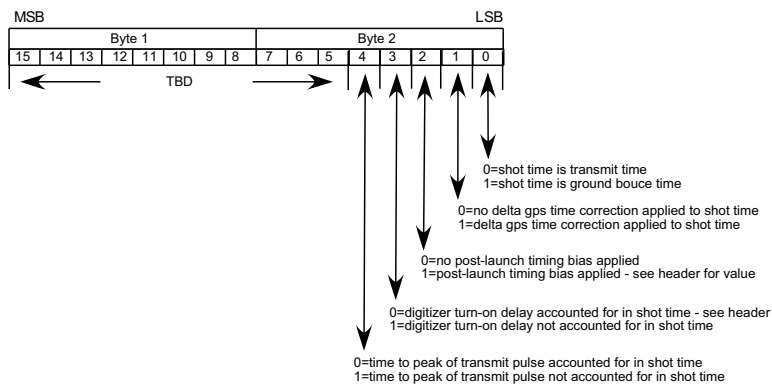
Figure 5-7 Range Data Source Flag

1 bit sets of values; 0=False, 1=True



### Figure 5-8 Range Window Status Word

i\_timecorflg [1/sec for GLA01-15]: Correction Status Flag

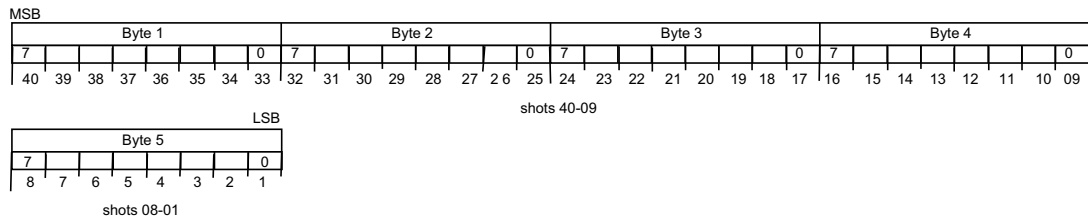


### Figure 5-9 Correction Status Flag



**i\_TxFlg [1/sec for GLA01\_main]: Transmit Pulse Flag;** One flag per shot; indicates quality to use based on valid or invalid criteria  
**1-bit flags, 40/second.**

**0=Transmit Pulse is telemetered (valid)**  
**1=Transmit Pulse is not telemetered (invalid)**

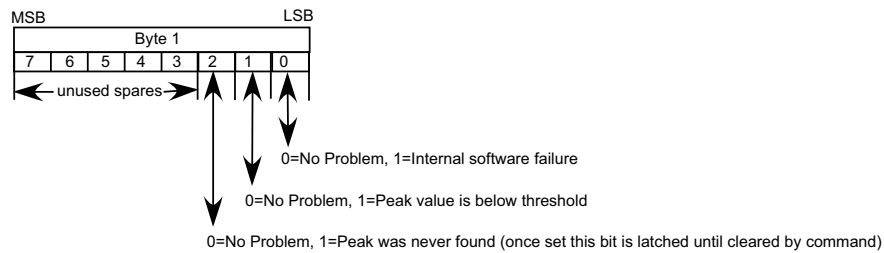


**Figure 5-10 Transmit Pulse Flag**

**i\_txWfPk\_Flag [GLA01\_Main, GLA04-01(LPA)]:** Transmit Waveform Peak Status Flag

Note: i\_txWfPk\_Flag is a 1 byte flag. One byte corresponds to 1/40 of a second. The first byte flag corresponds to the first 1/40 second of data.

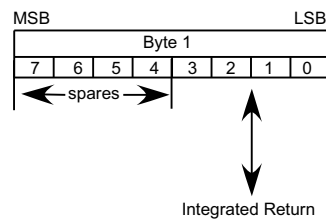
1 bit flags, 40 per second



**Figure 5-11 Transmit Waveform Peak Status Flag**

**i\_g\_IntRet\_qf [GLA02]:** Integrated Return Quality Flag

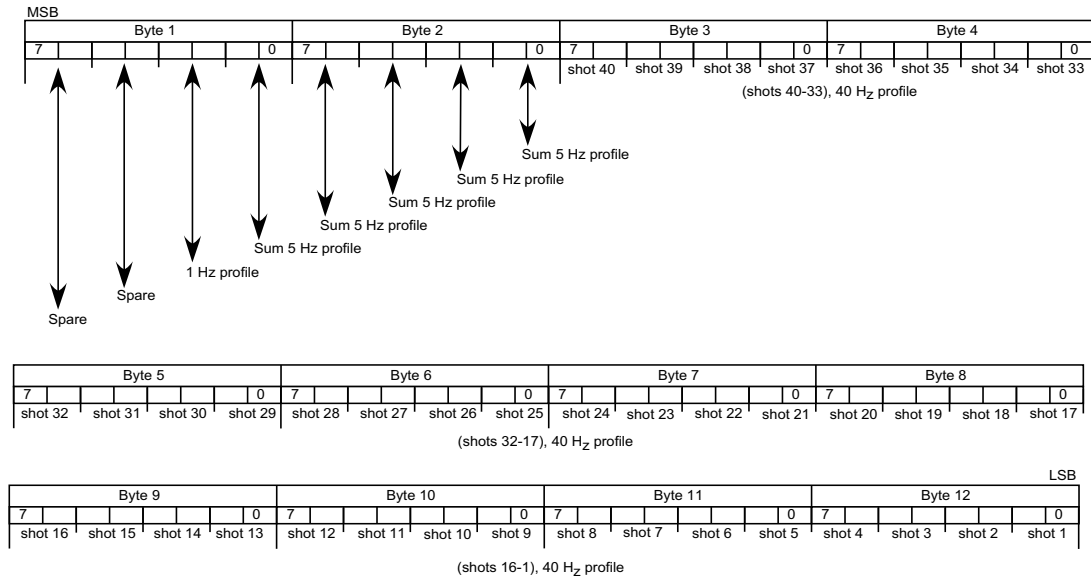
4-bit set of values: 0 = unused, 1 = excellent, 2 = good, 3 = marginal, 5 = bad data



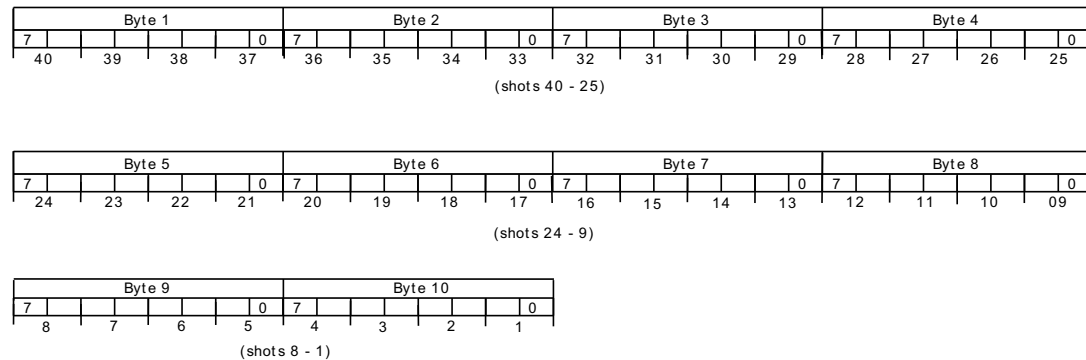
**Figure 5-12 Integrated Return Quality Flag**

**i\_g\_lid\_qf** [GLA02]: 532nm LIDAR Data Quality Flag

2 bits per shot

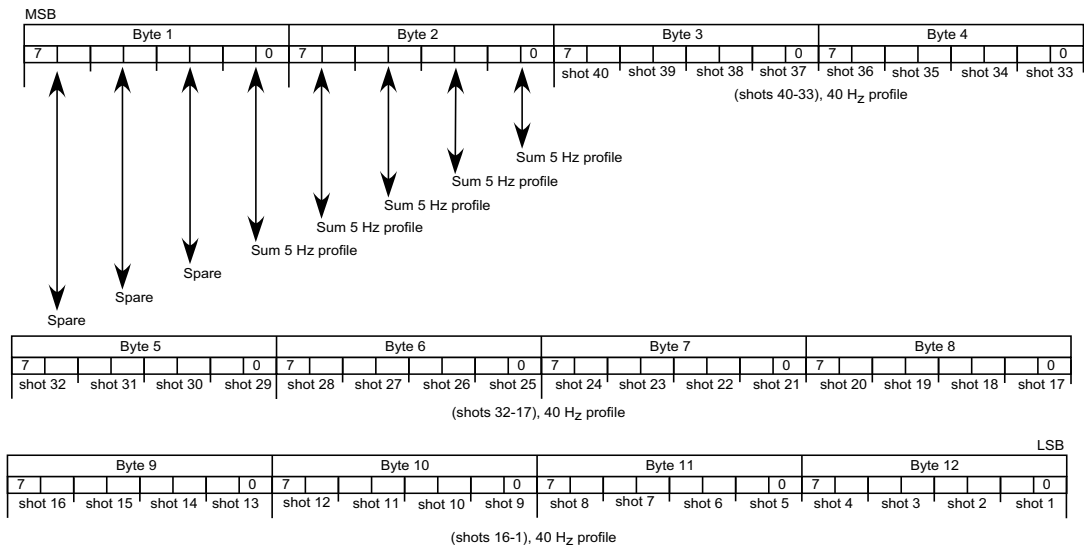
**Figure 5-13 532nm LIDAR Data Quality Flag****i\_g\_TxNrg\_qf** [GLA02,07]: 532 nm Laser Transmitted Energy Quality Flag

2 bit per shot values: 0=not used, 1=full laser energy, 2=marginal laser energy, 3=deficient laser energy

**Figure 5-14 532 nm Laser Transmitted Energy Quality Flag**

**i\_ir\_lid\_qf [GLA02]:** 1064nm LIDAR Data Quality Flag

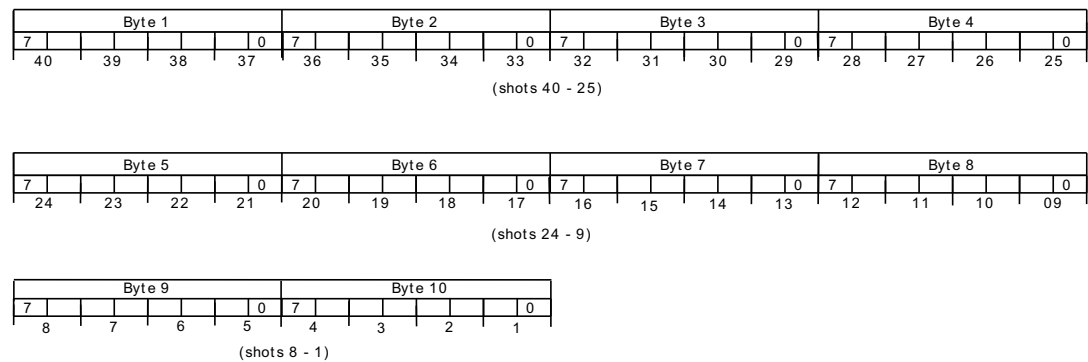
2 bits per shot



**Figure 5-15 1064nm LIDAR Data Quality Flag**

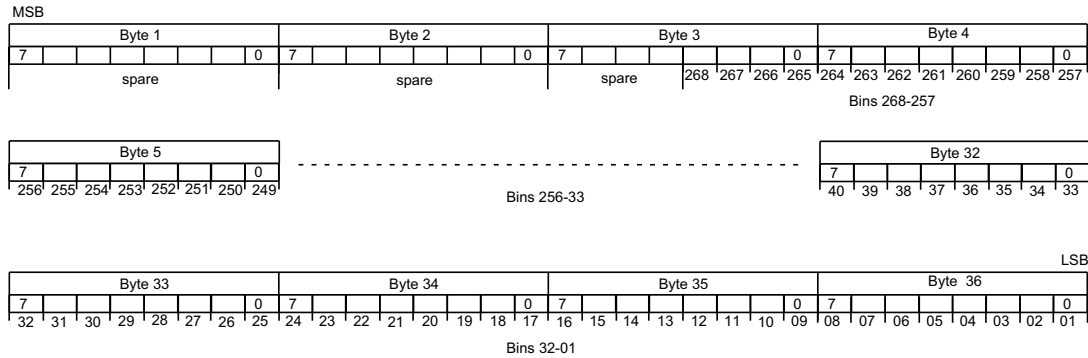
**i\_ir\_TxNrg\_qf [GLA02, 07]:** 1064 nm Laser Transmitted Energy Quality Flag

2 bits per shot values: 0=not used, 1=full laser energy, 2=marginal laser energy, 3=deficient laser energy



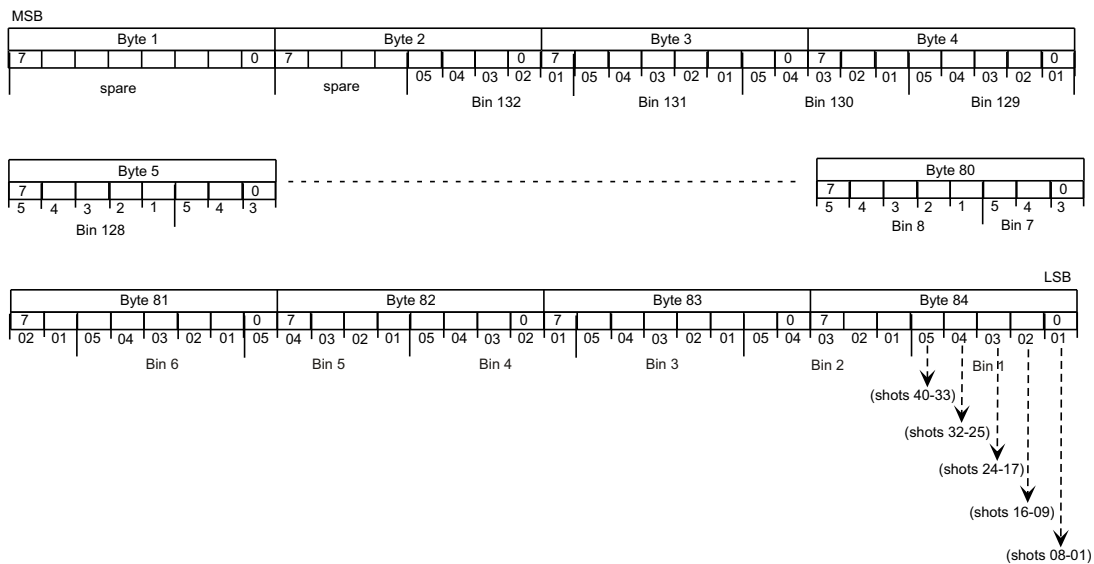
**Figure 5-16 1064 nm Laser Transmitted Energy Quality Flag**

**i1\_g\_sat\_f [GLA02]:** Bit flag indicating whether the 532 nm signal is saturated or not for the 40 to 20 KM Segment. 1 bit per each sum of 40 shots per bin (268); 0 = not saturated, 1 = saturated.



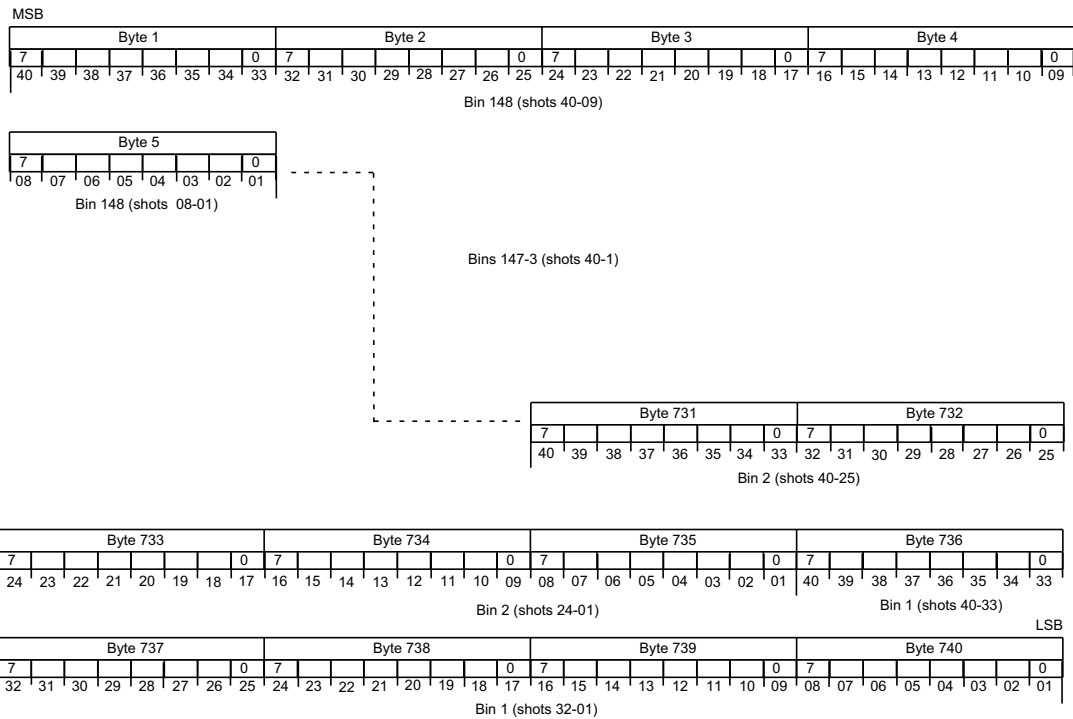
**Figure 5-17 Bit flag indicating whether the 532 nm signal is saturated or not for the 40 to 20 KM Segment**

**i5\_g\_sat\_f [GLA02]:** Bit flag indicating whether the 532 nm signal is saturated or not for the 20 to 10 KM Segment. 1 bit per each sum of 8 shot(40) per bin (132); 0 = not saturated, 1 = saturated.



**Figure 5-18 Bit flag indicating whether the 532 nm signal is saturated or not for the 20 to 10 KM Segment**

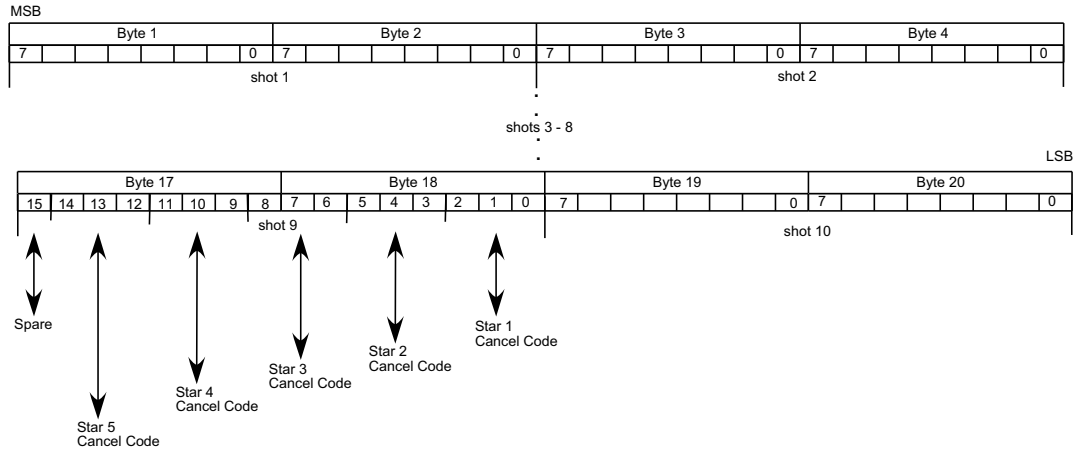
**i40\_g\_sat\_f [GLA02]:** Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM Segment.  
 1 bit per each shot(40) per bin (148); 0 = not saturated, 1 = saturated.



**Figure 5-19 Bit flag indicating whether the 532 nm signal is saturated or not for the 10 to -1 KM Segment**

i\_bst\_cancelcode i\_bst1\_cancelcode[GLA04-05]: BST1 Cancel Code Word  
 i\_bst2\_cancelcode[GLA04-05]: BST2 Cancel Code Word

Two bytes per shot, 10/second



#### Cancel Code Values

- 0 = No Term
- 1 = Overlap
- 2 = No FOV
- 3 = Too Dark
- 4 = Hot Pixel
- 5 = Column Defect
- 6 = Break Track
- 7 = Dropped

**Figure 5-20 BST1 Cancel Code Word BST2 Cancel Code Word**

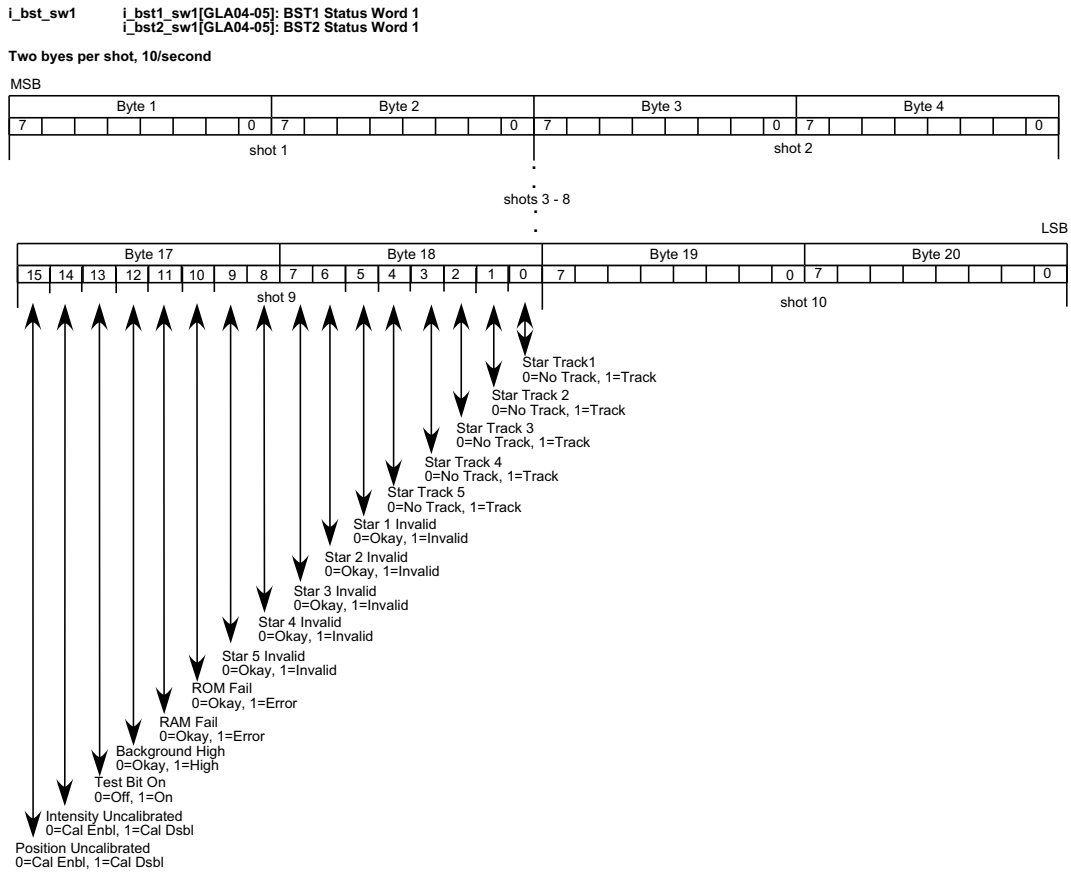


Figure 5-21 BST1 Status Word BST2 Status Word 1

i\_bst\_sw2 i\_bst1\_sw2[GLA04-05]: BST1 Status Word 2  
i\_bst2\_sw2[GLA04-05]: BST2 Status Word 2

Two bytes per shot, 10/second

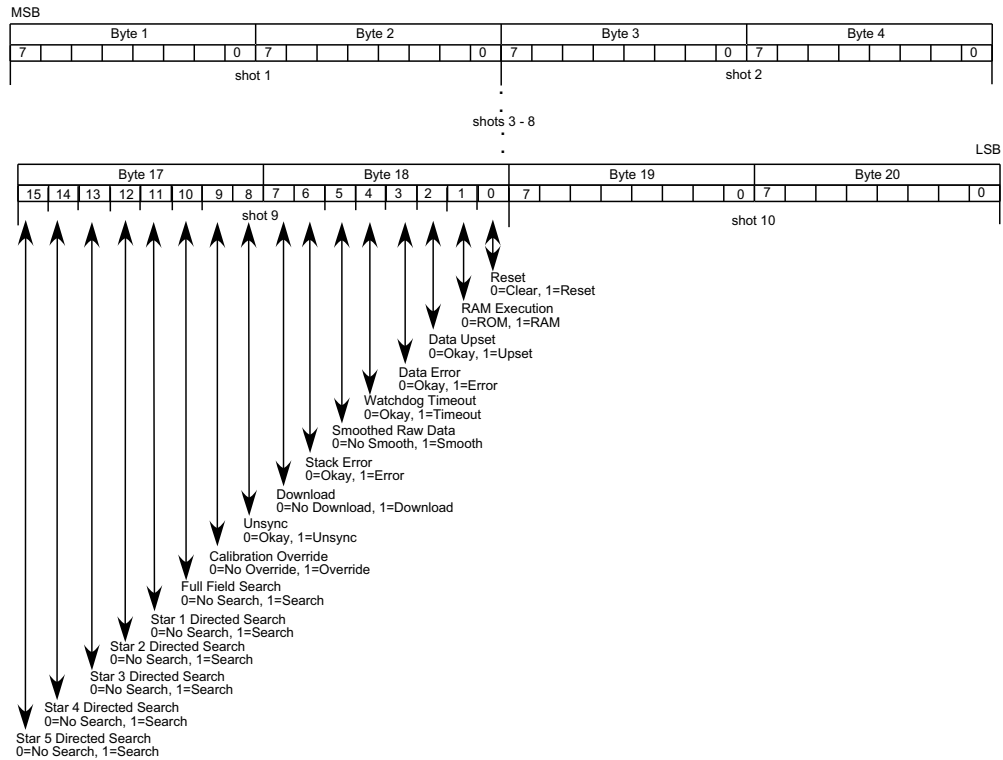


Figure 5-22 BST1 Status Word 2 BST2 Status Word 2



i\_ist\_flag [GLA04-04]: IST Flag  
1 byte flag, 10/second

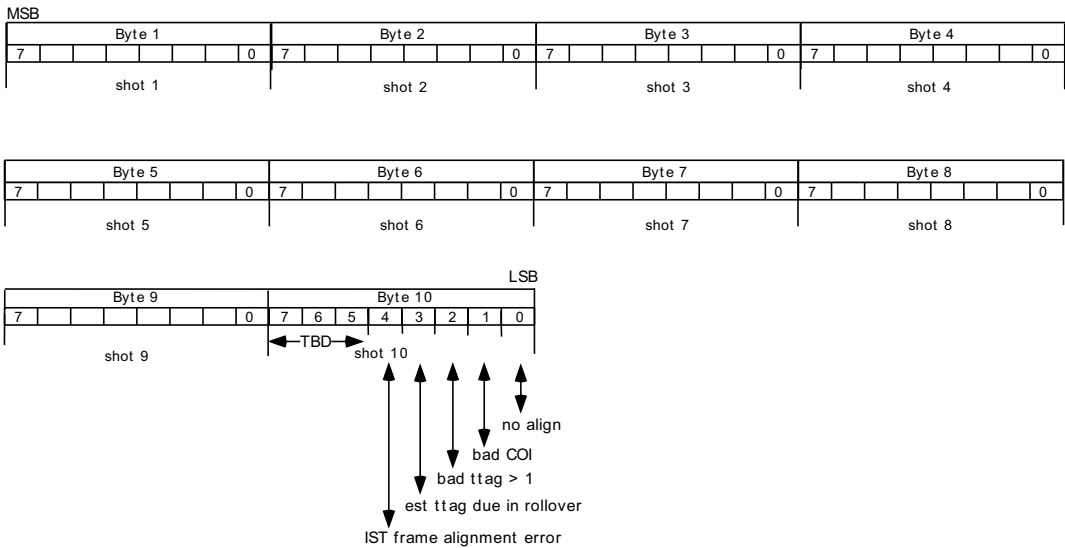


Figure 5-23 IST Flag

i\_lrs\_flag [GLA04-02]: LRS Flag  
1 byte flag, 10/second

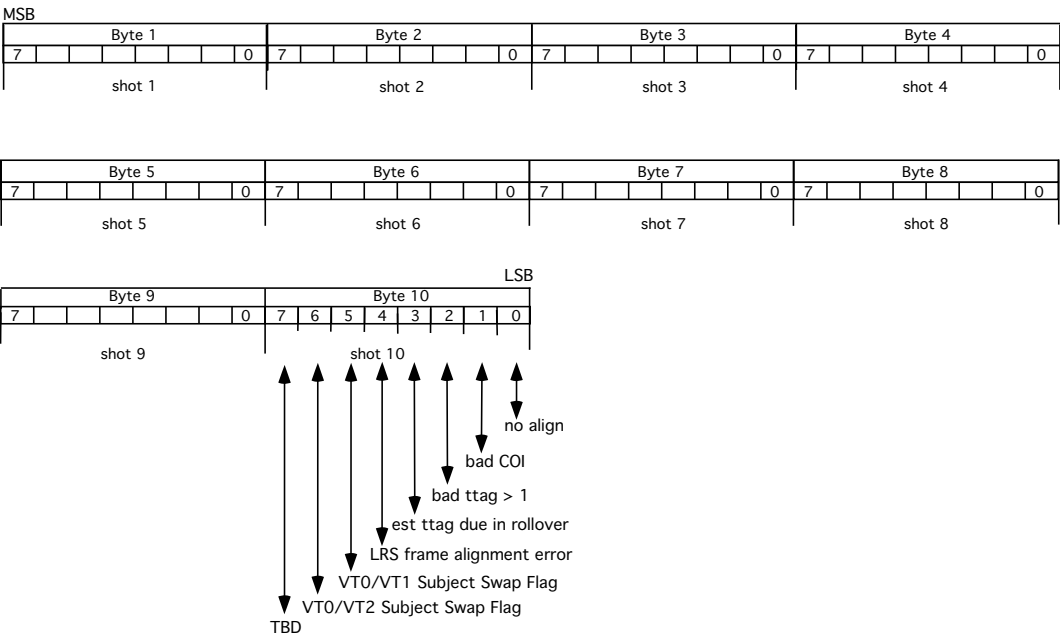


Figure 5-24 LRS Flag

i\_siru\_valdata [GLA04-03]: SIRU Data Valid Word

Two bytes per shot, 10/second

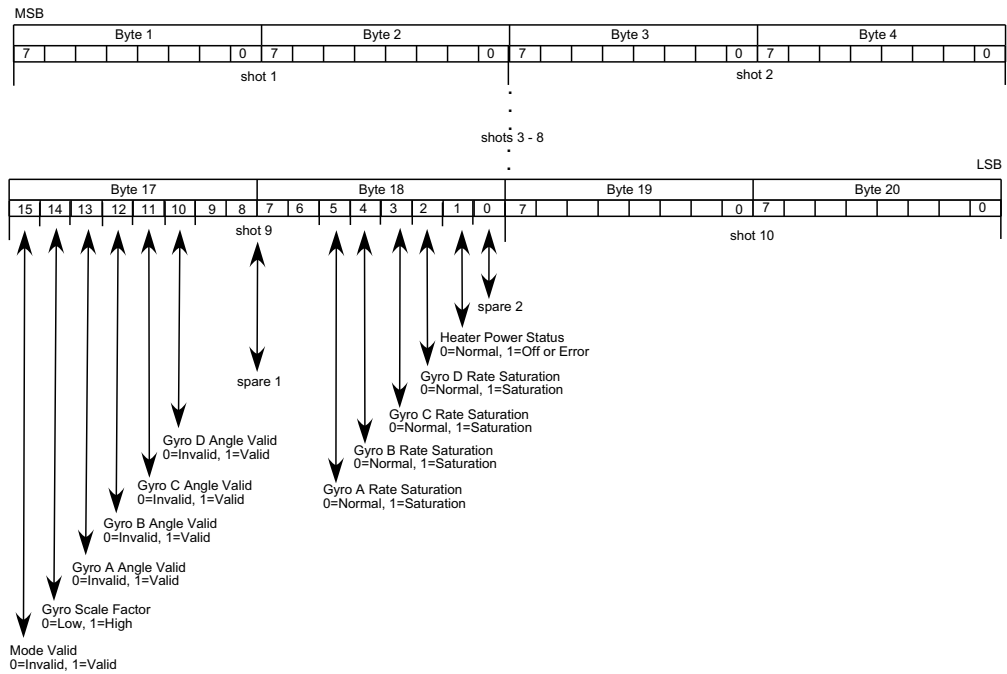
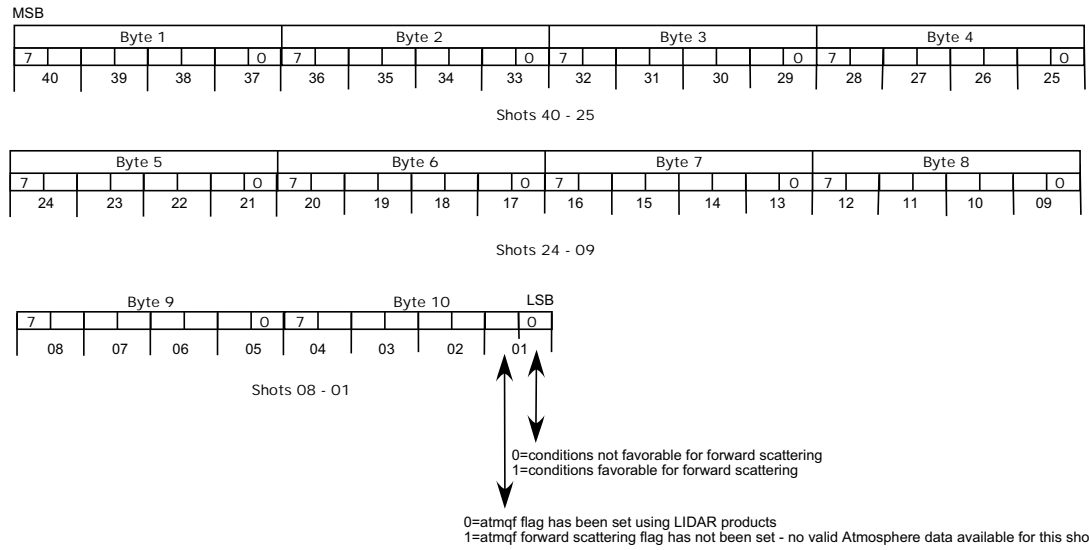


Figure 5-25 SIRU Data Valid Word

**I\_atmQF [1/sec for GLA05, 06, 12-15]: Atmosphere Flag**

2 bit flags, 40/second

**Figure 5-26 Atmosphere Flag**

i\_AttFig1 [1/sec for GLA05-15]: Attitude Flag 1

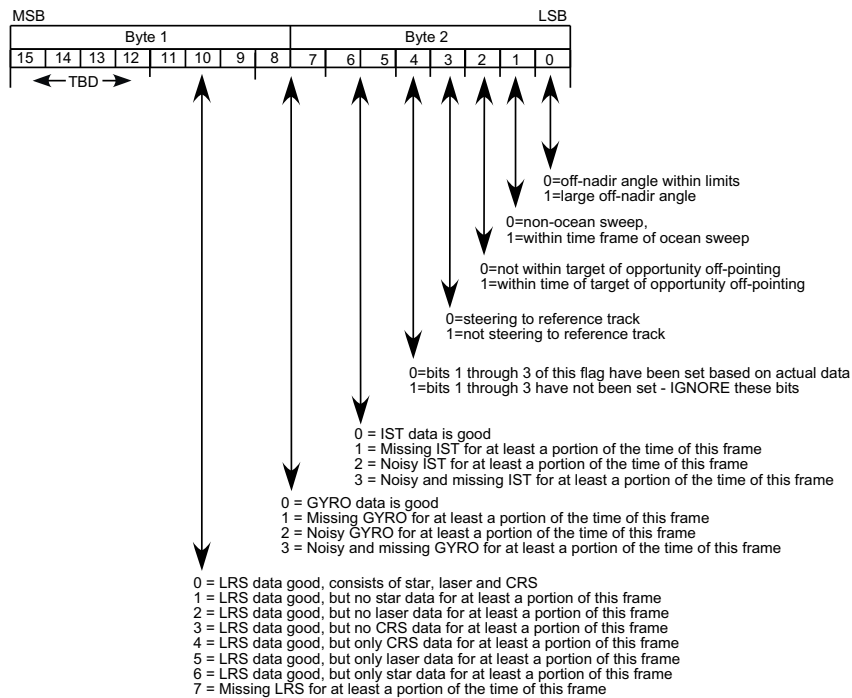
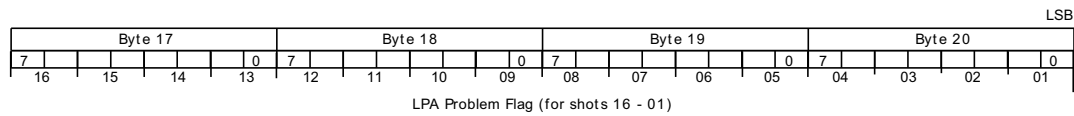
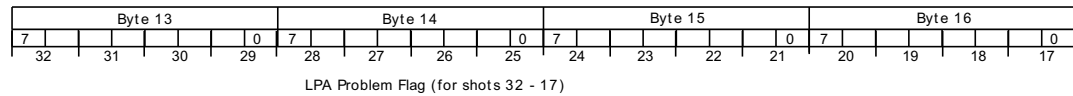
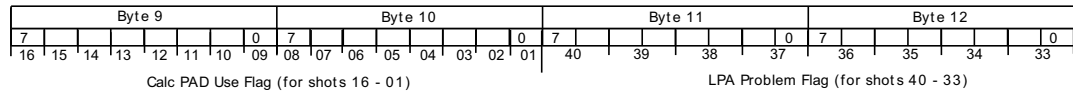
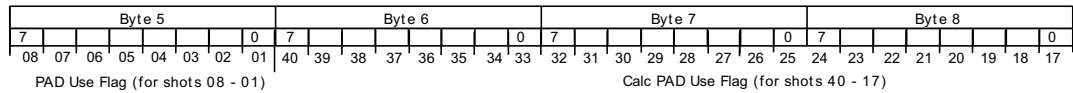
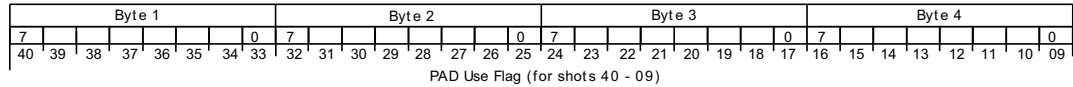


Figure 5-27 Attitude Flag 1

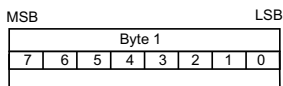
**i\_AttFig2 [1/sec for GLA05,06,12-15]: Attitude Flag 2**

Bytes 1-5, PAD Use Flag: 1 bit/shot values; 0 = PAD used to determine spot location, 1 = PAD not used to determine spot location  
 Bytes 6-10, Calc PAD Use Flag: 1 bit/shot values; 0 = new PAD used to determine orbit, 1 = pass-thru PAD not used to determine orbit  
 Bytes 11-20, LPA Problem Flag: 2 bit/shot values; 0 = no problems with LPA, 1 = missing LPA, 2 = noisy LPA

MSB

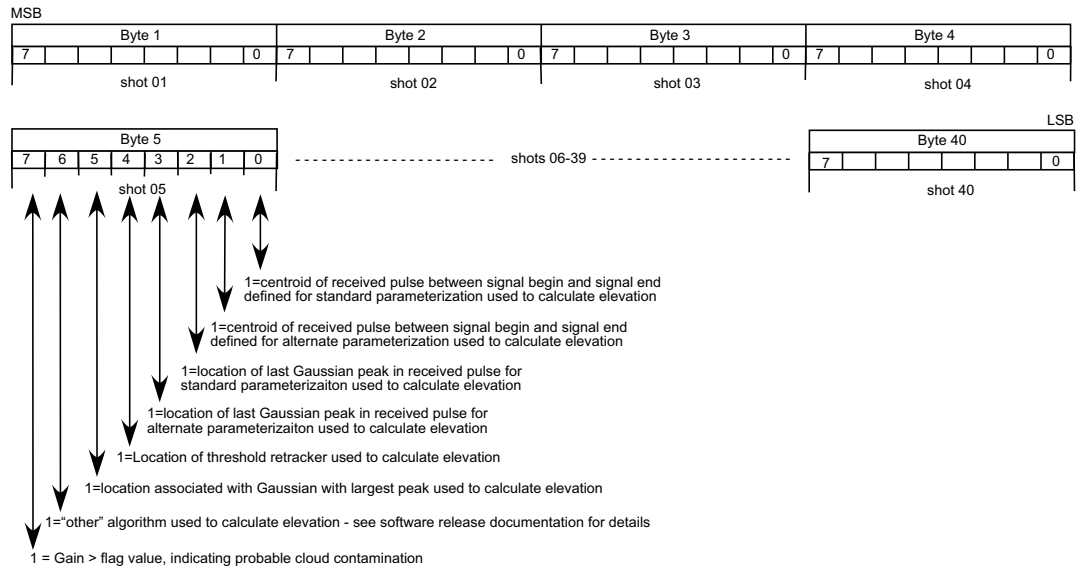
**Figure 5-28 Attitude Flag 2****i\_AttFig3 [1/sec for GLA07-11]: Attitude Flag 3**

0=PAD used for geolocation  
 1=PAD not used for geolocation

**Figure 5-29 Attitude Flag 3**

**i\_ElvFig [1/sec GLA05, 06, 12-15]: Elevation Definition Flag;** Indicates which location on the received echo was used to calculate the elevation on the record.

**1-byte flags, 40/second.**



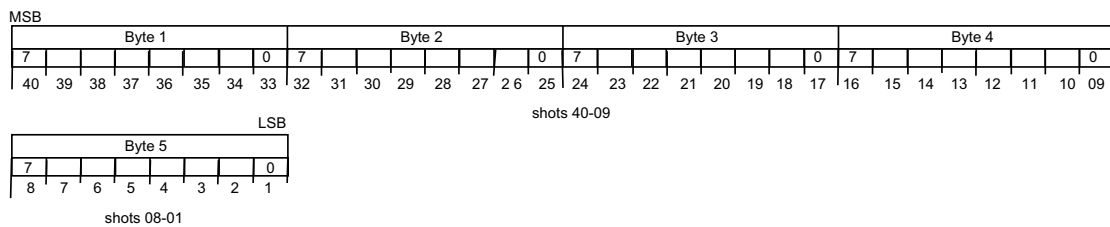
**Figure 5-30 Elevation Definition Flag**

**i\_ElvuseFig [1/sec for GLA05, 06, 12-15]: Elevation Use Flag;** One flag per shot; indicates quality to use based on valid or invalid criteria

**1-bit flags, 40/second.**

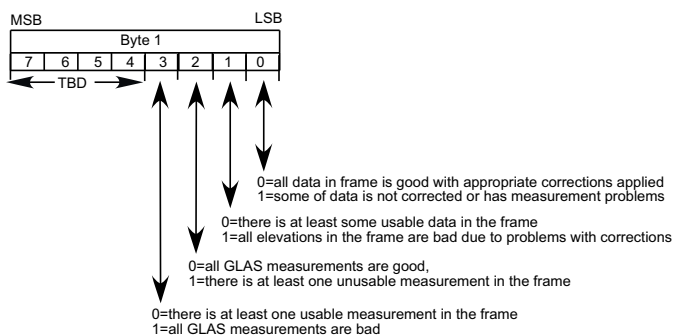
0=elevation is valid

1=elevation is invalid



**Figure 5-31 Elevation Use Flag**

**i\_FrameQF [1/sec for GLA05,06,12-15]: Altimeter Quality Flag**

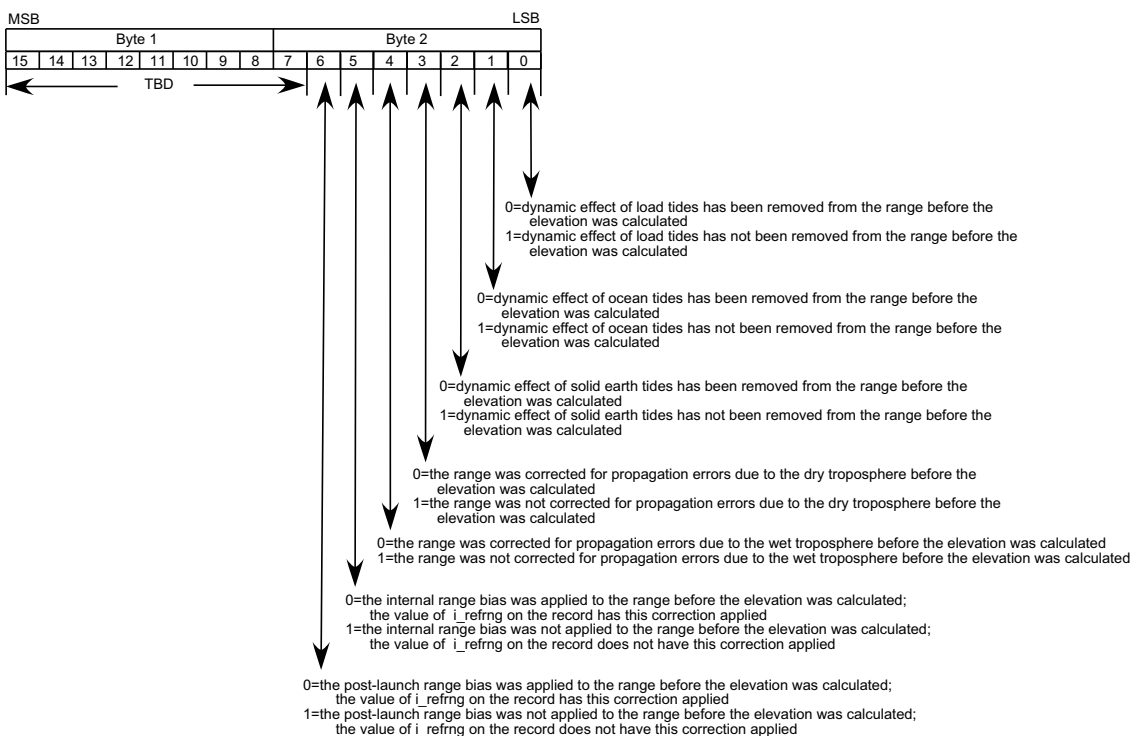


**Figure 5-32 Altimeter Quality Flag**

**i\_rngCorrFlg [1/sec for GLA05, 06, 12-15]: Range Correction Flag**

2 byte set of 1 bit values: 0=used, 1=not used

Note: This is a range correction flag. Some of the corrections are applied to the reference range, *i\_refrng* on the data record, and some of them are used in the calculation of the elevation but are not applied to the reference range.



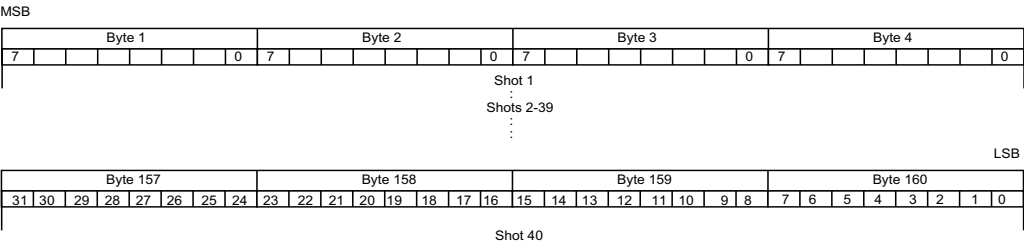
**Figure 5-33 Range Correction Flag**



i\_WFqual [GLA05]:Waveform Quality Flags

4 byte set of 32 bit flags, 40/second

Page 1 of 3



Breakdown of shot 40, Bytes 157 - 158, Bits 31-16

i\_WFqual [GLA05]:Waveform Quality Flags (continued)

4 byte set of 32 bit flags, 40/second

Page 2 of 3

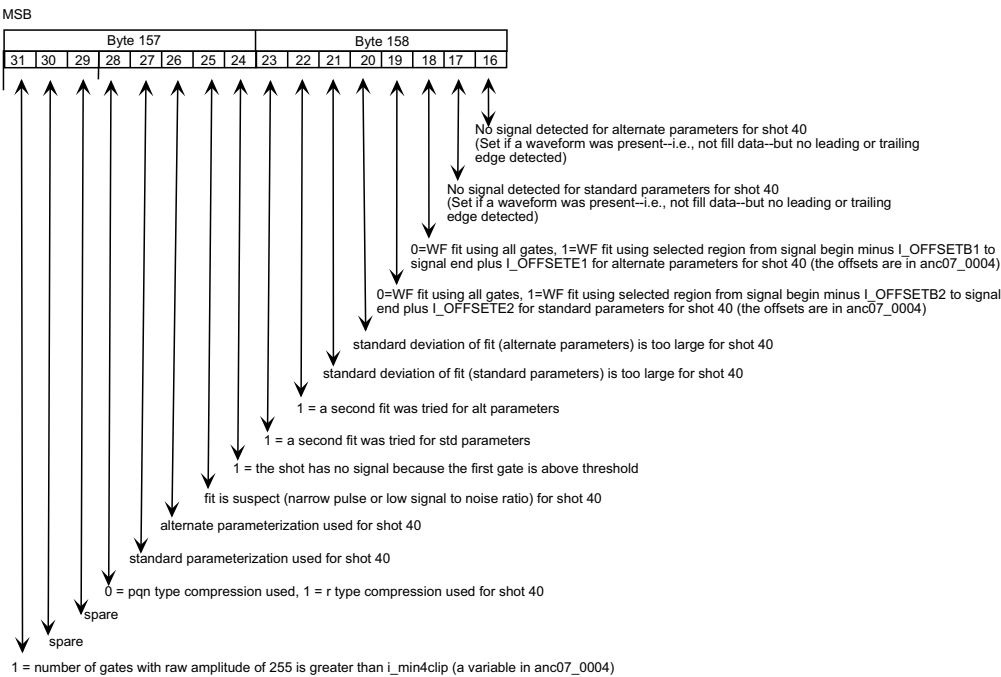


Figure 5-34 Waveform Quality Flags

Breakdown of shot 40, Bytes 159 - 160, Bits 15-0

i\_WFqual [GLA05]: Waveform Quality Flags (continued)

Page 3 of 3

4 byte set of 32 bit flags, 40/second

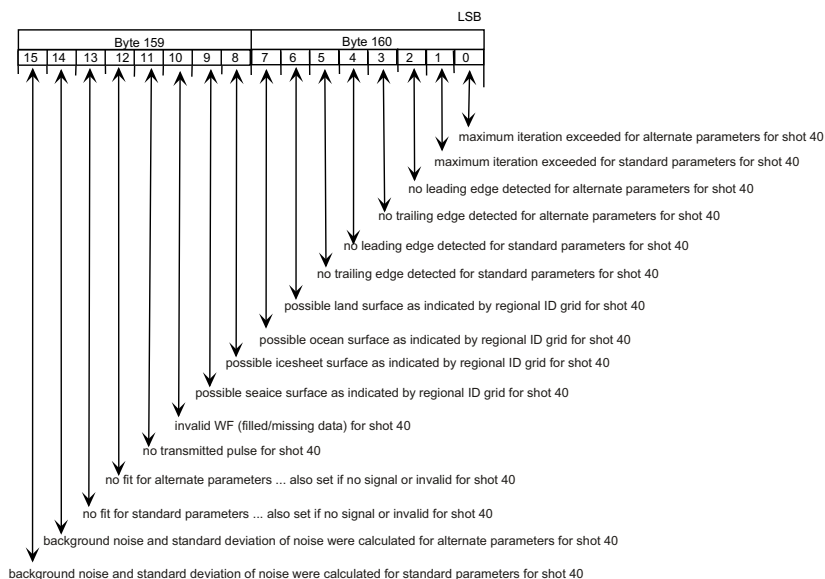


Figure 5-34 Waveform Quality Flags (Continued)

I\_atm\_avail [1/sec for GLA06, 12-15]: Atmosphere Availability Flag

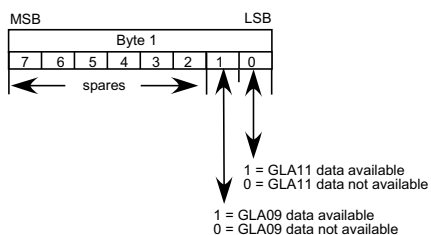
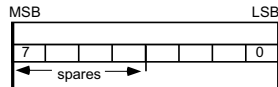


Figure 5-35 Atmosphere Availability Flag

**i\_cld1\_mswf [GLA06, 12-15]: Multiple Scattering Warning Flag**

4 bit set of values;

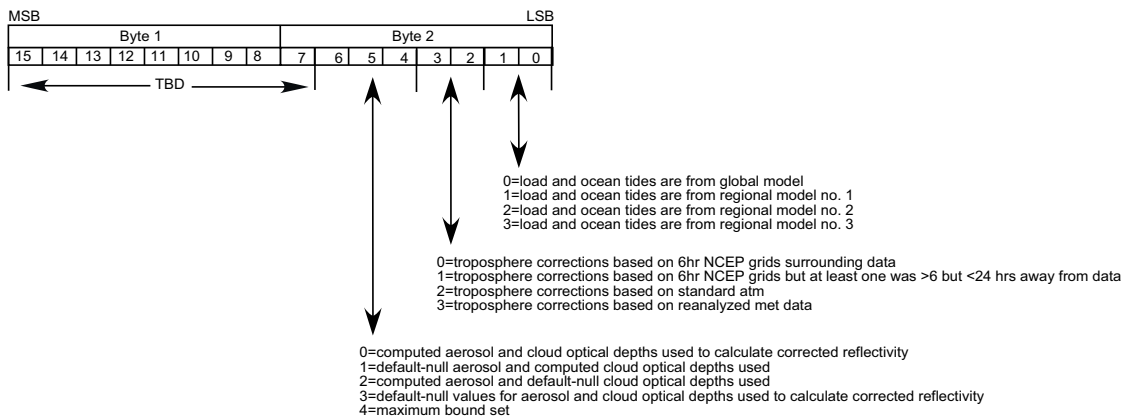
0	= < 0.010
1	= 0.010 - 0.030
2	= 0.030 - 0.060
3	= 0.060 - 0.100
4	= 0.100 - 0.150
5	= 0.150 - 0.225
6	= 0.225 - 0.300
7	= 0.300 - 0.400
8	= 0.400 - 0.500
9	= 0.500 - 0.670
10	= 0.670 - 0.900
11	= 0.900 - 1.200
12	= 1.200 - 1.600
13	= 1.600 - 2.000
14	= > 2.000
15	= Invalid



Note: A warning flag value of 15 will be the default whenever no 532nm signal is available (as when the 532 laser energy is < 4 mJ during daytime). To distinguish this case from that of optically thick clouds, one must check the number of layers. If there were zero layers reported, but the MSWF is 15, then the cause is the lack of useable 532 data. If the number of layers is > 0 and the MSWF is 15, then the cause is total extinction of the lidar beam (this happens for clouds of optical depth > about 3).

A warning flag of '0' is a very good indicator of no layers or a layer so thin it won't cause any altimetry range delays.

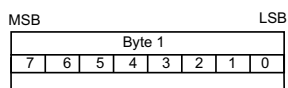
**Figure 5-36 Multiple Scattering Warning Flag**

**i\_CorrStatFig [1/sec for GLA06, 12-15]: Correction Status Flag**

**Figure 5-37 Correction Status Flag**

**i\_DEM\_hires\_src [1/sec for GLA06,12-14]: High Resolution Source Flag**

1-byte flag, 40/second

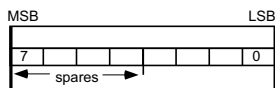


Values:

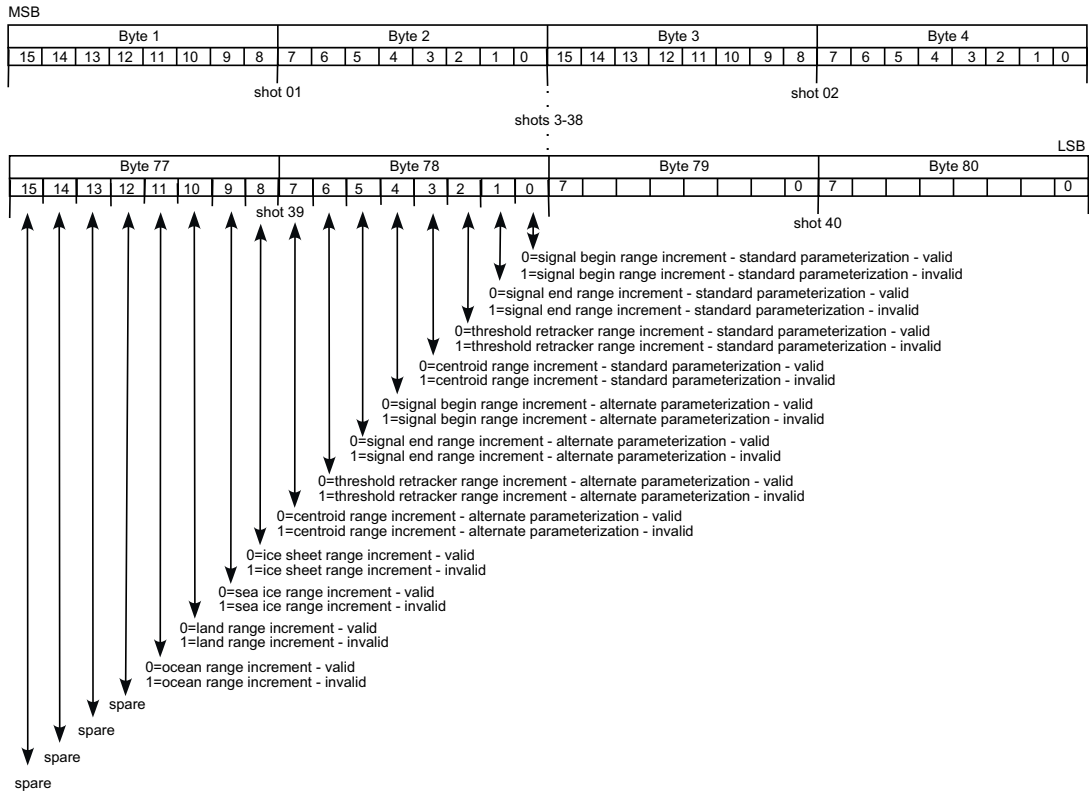
- 0 = no high res source available
- 1 = "unfinished research" Shuttle Radar Topography Mission (SRTM)  
C-band 90 m DEM produced by JPL (+/-1.1km E-W swath)
- 2 = "finished" SRTM C-band 90 m DEM produced by NGA (+/-2.1km E-W swath)
- 3 = ICESat Greenland V1 1km DEM
- 4 = ICESat Antarctica V1 500m DEM
- 5 = 90m Canadian Digital Elevation Data (CDED)
- 6 = 90m Canadian Digital Elevation Data (CDED) if available otherwise "finished" SRTM C-band 90 m DEM

**Figure 5-38 High Resolution Source Flag****i\_MRC\_af [GLA06, 12-15]: Medium Resolution Cloud Availability Flag**

af = availability flag (extracted from the af bits of i\_MRCL\_flag on GLA09): Tells how many cloud layers were found at this resolution from the 532 nm channel. Value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected. Rate is once per second.

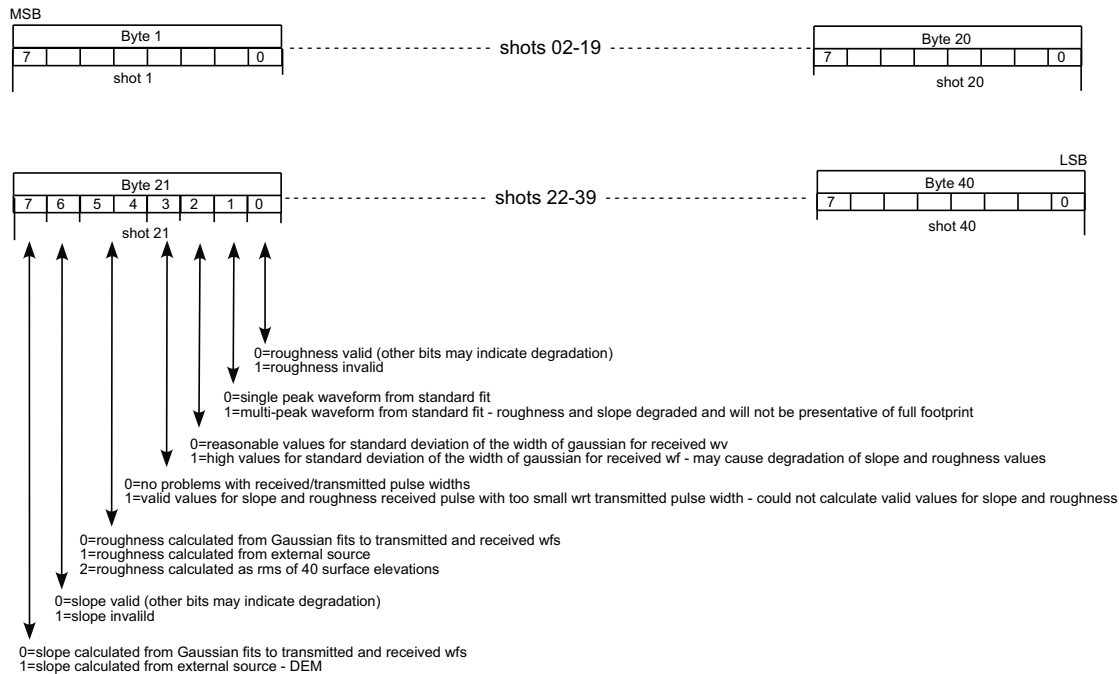
**Figure 5-39 Medium Resolution Cloud Availability Flag**

**i\_rng\_UQF [1/sec for GLA06, 12-15]: Range Increment Quality/Use Flag;** Two bytes per shot. Shot 1 is in first location in array.



**Figure 5-40 Range Increment Quality/Use Flag**

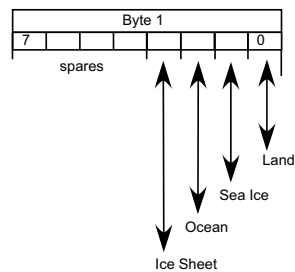
**i\_SurfRuf\_slpQF [1/sec for GLA06, 12,14]: Surface Roughness and Slope Quality Flag:** One byte per shot data quality flag.



**Figure 5-41 Surface Roughness and Slope Quality Flag**

**i\_surfType [GLA06, 12-15]: Region Type**  
1 byte of 1 bit values

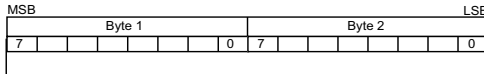
Note: Multiple surface type bits may be set for a given location. i.e. Land and Ice Sheet bits are set for any grounded ice.



**Figure 5-42 Region Type**

**i\_LidarQF** [1/sec for GLA07], [1/4 sec for GLA08-11]: Lidar Frame Quality Flag

0=good data  
1=data unsuitable for L2 processing due to weak 532 laser energy or high background  
2=either SPCMs not turned on or bad background



**Figure 5-43 Lidar Frame Quality Flag**

**i\_532AttBS\_Flag** [GLA07]: 532 nm Attenuated Backscatter Vertical Profile Flag

i40\_g\_bscs\_uf = use flag at 40Hz: value 0 = no, saturated bins were replaced; value 1 = yes, saturated bins were replaced

i40\_g\_bscs\_qf = quality flag at 40Hz: value 0 = good data; value 1 = if 532 nm laser energy flag equals 3; value 2 = if 1064 nm quality flag equals 1 and 1064 nm backscatter value replaced 532 nm backscatter value

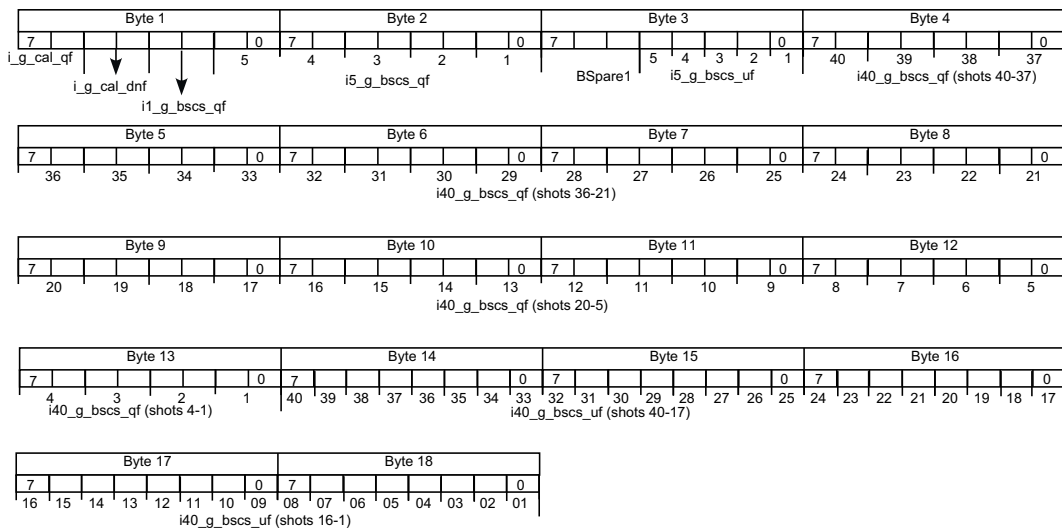
i5\_g\_bscs\_uf = use flag at 5Hz: value 0 = no, saturated bins were replaced; value 1 = yes, saturated bins were replaced

i5\_g\_bscs\_qf = quality flag at 5Hz: value 0 = good data; value 1 = if 532 nm laser energy flag equals 3; value 2 = if 1064 nm quality flag equals 1 and 1064 nm backscatter value replaced 532 nm backscatter value

il\_g\_bscs\_qf = quality flag at 1 sec: value 0 = good quality; value 2 = 532 nm integrated return is bad; value 3 = ratio of integrated return to molecular integrated return is bad

i\_g\_cal\_qf = quality flag: value 0 = good quality; value 2 = if no records left after elimination tests, value before elimination tests used instead

i\_g\_cal\_dnf = day/night flag: value 0 = indeterminate; value 1 = night; value 2 = day



**Figure 5-44 532 nm Attenuated Backscatter Vertical Profile Flag**

**i\_1064AttBS\_Flag [GLA07]: 1064 nm Attenuated Backscatter Vertical Profile Flag**

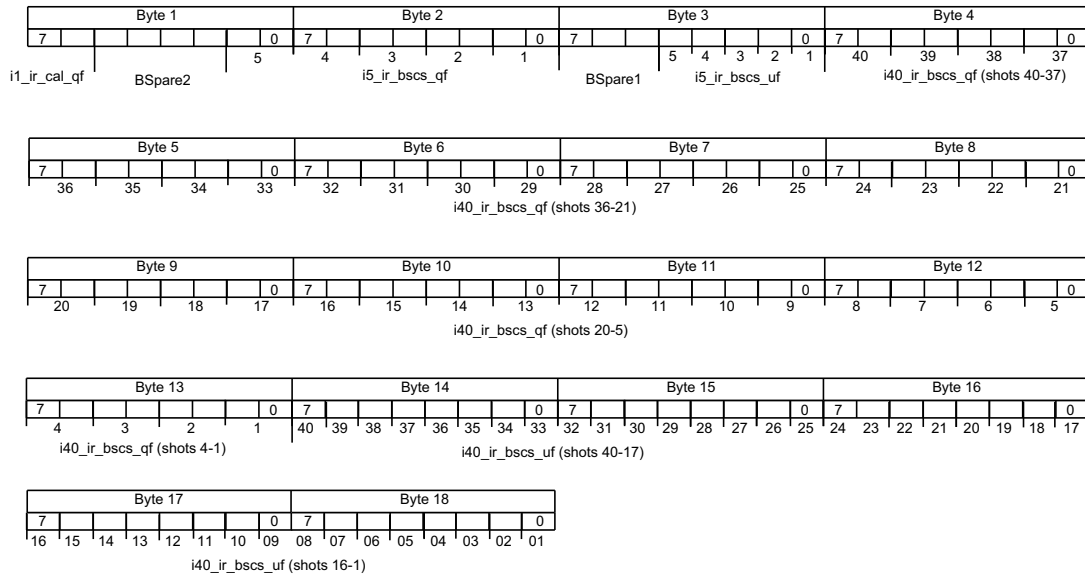
i40\_ir\_bscs\_uf = use flag: not used

i40\_ir\_bscs\_qf = quality flag at 40Hz: value 0 = good data; value 1 = if 1064 nm laser energy flag equals 3

i5\_ir\_bscs\_uf = use flag: not used

i5\_ir\_bscs\_qf = quality flag at 5Hz: value 0 = good data; value 1 = if 1064 nm laser energy flag equals 3

i1\_ir\_cal\_qf = quality flag: value 0 = good quality; value 2 = if no records left after elimination tests, value before elimination tests used instead

**Figure 5-45 1064 nm Attenuated Backscatter Vertical Profile Flag**



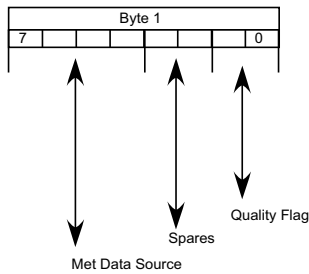
**L\_metFig [GLA07]: Meteorological/Standard Atmospheric Data Source/Quality Flag**

The met data used by the atmospheric processing routines normally consists of 2 global gridded data sets, one before the GLAS observation time and one after. They are both normally within 6 hours of the GLAS observation time. A check is made on the time of the MET files and if either one is > 24 hours from the GLAS observation time, it is not used. If both files are not used, then the standard atmosphere data is according to the latitude and season.

Met Data Source:

- 0 : use both met files
- 1 : use first met file
- 2 : use second met file
- 3 : use standard atmosphere, arctic summer
- 4 : use standard atmosphere, arctic winter
- 5 : use standard atmosphere, midlatitude summer
- 6 : use standard atmosphere, midlatitude winter
- 7 : use standard atmosphere, tropical

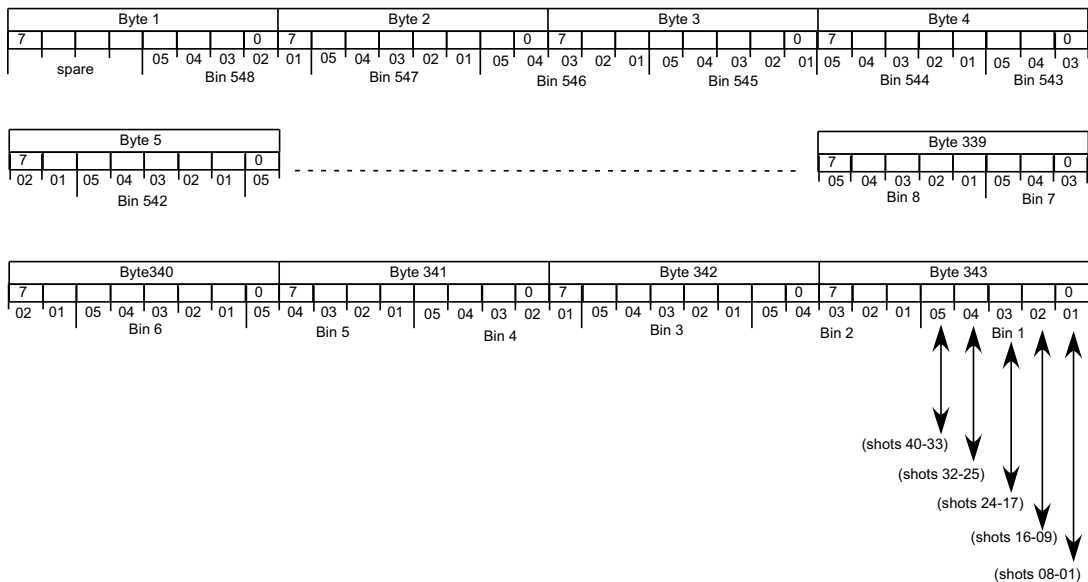
The quality flag is not used at this time.



**Figure 5-46 Meteorological/Standard Atmospheric Data Source/Quality Flag**

**i5\_g\_sat\_prof [GLA07]: 532 nm Saturation Flag Profile 40 to -1km. Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data.**

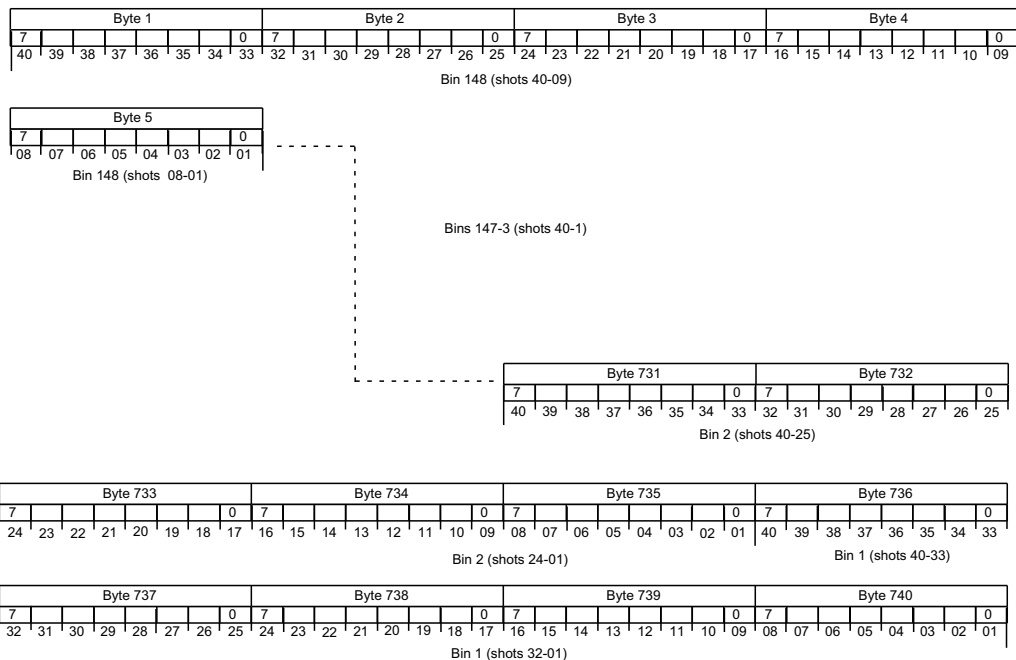
1 bit per each shot(40) per bin (548); 0 = not saturated, 1 = saturated.



**Figure 5-47 532 nm Saturation Flag Profile 40 to -1km**

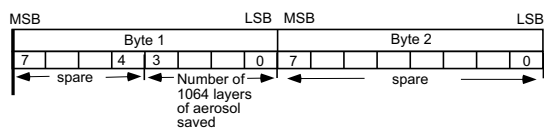
**i40\_g\_sat\_prof [GLA07]: 532 nm Saturation Flag Profile 10 to -1km.** Indicates whether the 532 data were saturated and therefore whether the value is converted from the 1064 data.

1 bit per each shot(40) per bin (148); 0 = not saturated, 1 = saturated.



**Figure 5-48 532 nm Saturation Flag Profile 10 to -1km**

**i\_Aer\_ir\_layflg [GLA08]: Layer Flag for 1064 Aerosol**



**Figure 5-49 Layer Flag for 1064 Aerosol**

**i\_LayHgt\_Flag [GLA08]: Layer Height Flag**

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i\_pscf: value 0 = not a Polar Stratospheric Cloud (PSC); value 1 = low likely; value 2 = medium likely; value 3 = high likely

i20\_aer\_qf = quality flag at 1 per 20 sec: value 0 = aerosol layers were searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = upper (>20 km) aerosol layers were not searched for

i20\_aer\_af = availability flag at 1 per 20 sec: Contains the number of aerosol layers found above 20 km from a 20 second average of the data. Value 0 = aerosol layers were searched for, but not detected; value 15 = aerosol layers were not searched for.

i20\_aer\_uf = use flag at 1 per 20 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i4\_aer\_qf = quality flag at 1 per 4 sec: value 0 = aerosol layers were searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = lower (<20 km) aerosol layers were not searched for

i4\_aer\_af = availability flag at 1 per 4 sec: Contains the number of elevated (excluding PBL) aerosol layers found below 20 km from a 4 second average of the data. Value 0 = aerosol layers were searched for, but not detected; value 15 = aerosol layers were not searched for.

i4\_aer\_uf = use flag at 1 per 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i\_HRpbl\_qf = quality flag at 5Hz for 4 sec: value 0 = PBL was searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = PBL not searched for

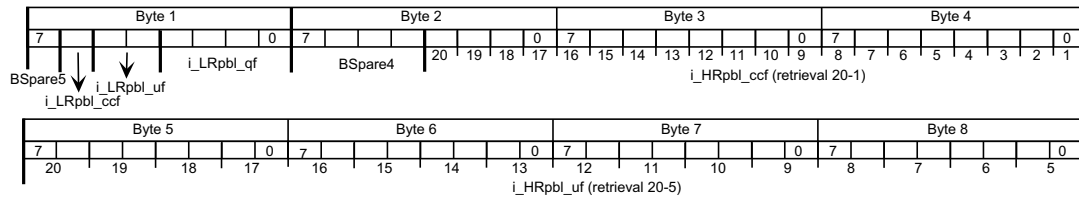
i\_HRpbl\_uf = use flag at 5Hz for 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i\_HRpbl\_ccf = clear/cloudy flag at 5Hz for 4 sec: value 0 = clear; value 1 = cloudy

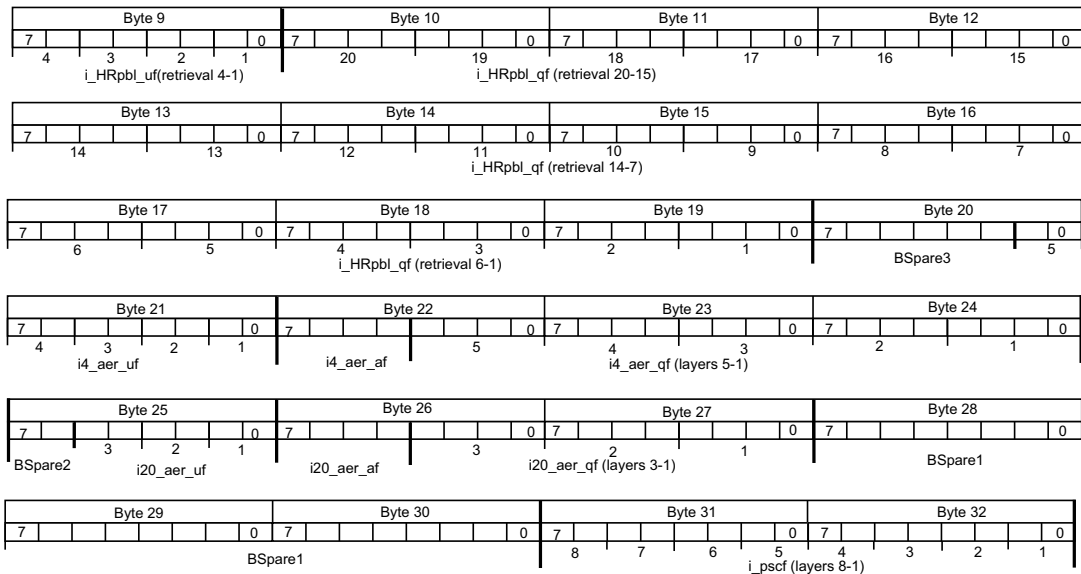
i\_LRpbl\_qf = quality flag at 1 per 4 sec: value 0 = PBL was searched for, but not detected; values 1 to 13 = increasing goodness; value 14 = bad; value 15 = PBL not searched for

i\_LRpbl\_uf = use flag at 1 per 4 sec: value 0 = no saturated bins present in layer; value 1 = saturated bins present in layer and replaced with 1064 data; value 2 = saturated bins present in layer and not replaced with 1064 data

i\_LRpbl\_ccf = clear/cloudy flag at 1 per 4 sec: value 0 = clear; value 1 = cloudy

**i\_LayHgt\_Flag [GLA08]: Layer Height Flag (continued)**

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**Figure 5-50 Layer Height Flag**

**i\_FRCL\_Flag [GLA09]: Full Resolution Cloud Layer Flag** (4 seconds per record, 40 per second rate)

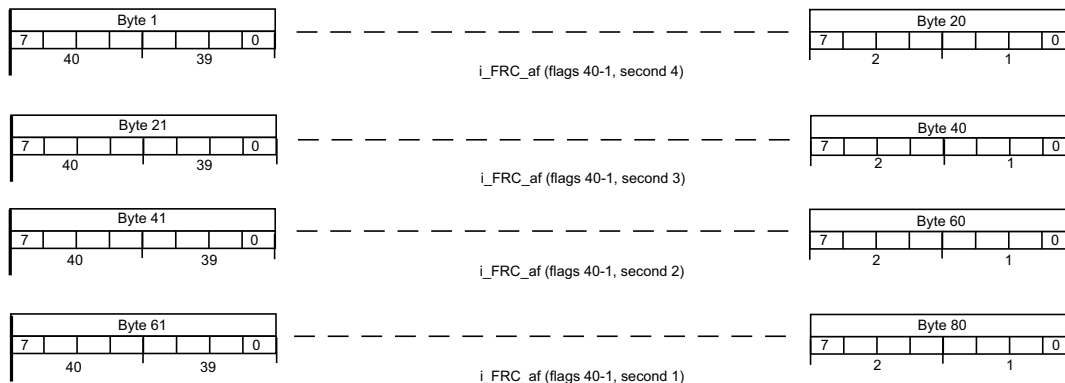
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af = availability flag: Tells how many cloud layers were found (from the 532 channel) at this resolution.  
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser resolution;  
value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

uf = use flag: not used at this time

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight



**Figure 5-51 Full Resolution Cloud Layer Flag**

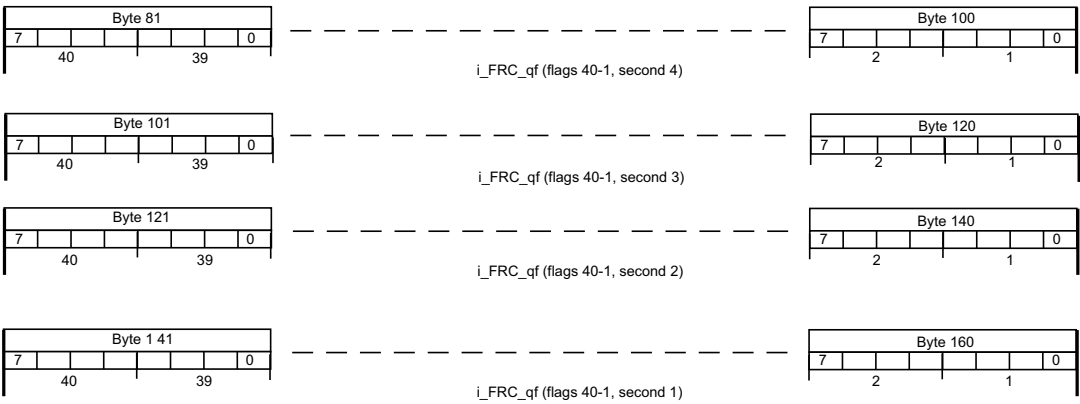
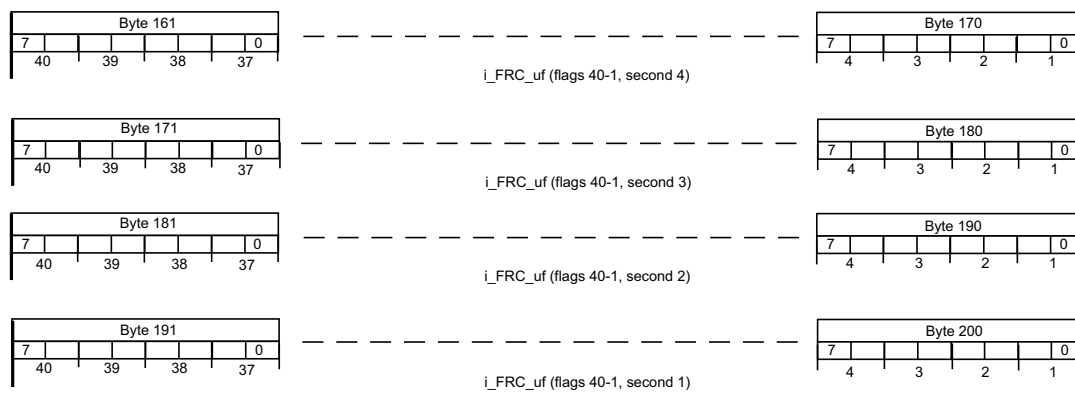


Figure 5-51 Full Resolution Cloud Layer Flag (Continued)

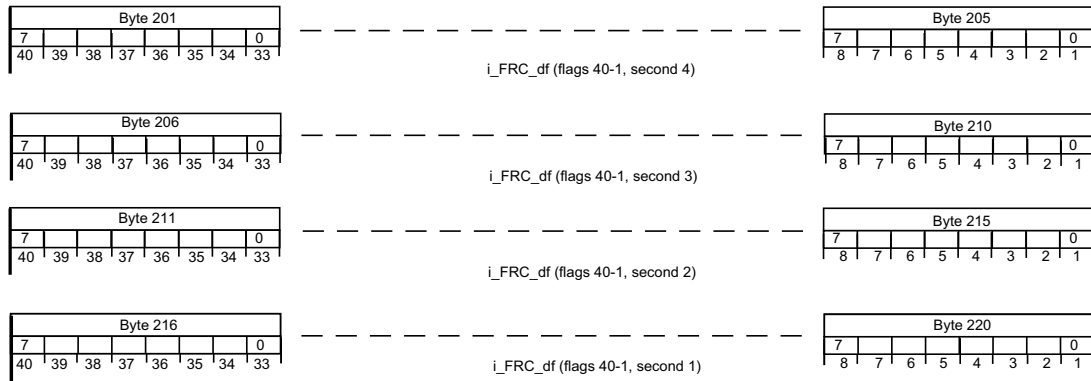
**i\_FRCL\_Flag [GLA09]: Full Resolution Cloud Layer Flag** (4 seconds per record, 40 per second rate)

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**Figure 5-51 Full Resolution Cloud Layer Flag (Continued)**

**i\_FRCL\_Flag [GLA09]: Full Resolution Cloud Layer Flag** (4 seconds per record, 40 per second rate)

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**Figure 5-51 Full Resolution Cloud Layer Flag (Continued)**

**i\_FRir\_qaFlag [GLA09, 11]: Full Resolution 1064 Quality Flag (i1b(160): 4 seconds per record, 40 per second rate)**

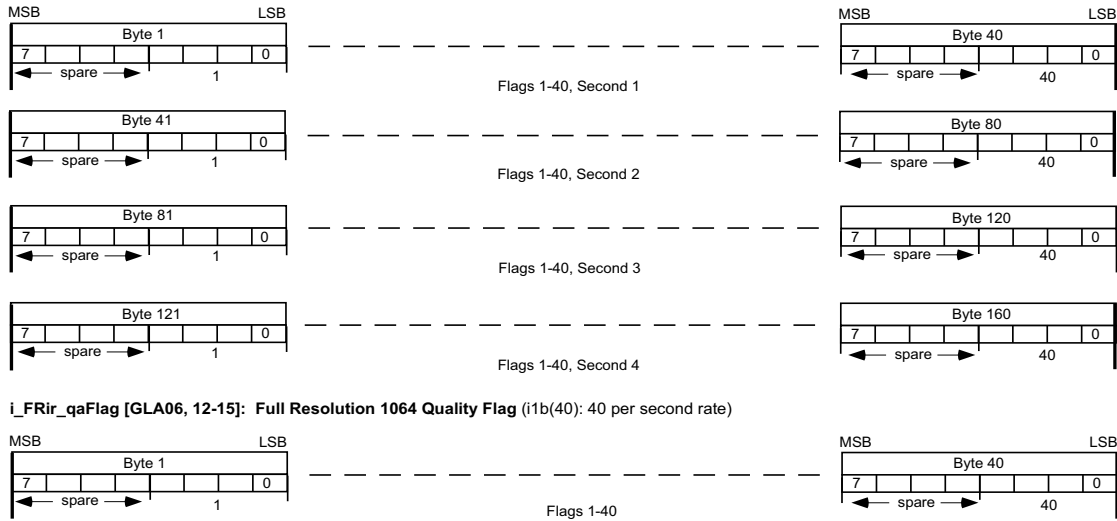
One byte per data quality flag

Value 15 = No clouds.

Value 14 = Indicates the likely presence of low clouds (< 150 m) based on elevated signal from the two bins above the ground return bin that were not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 0.10 km.

Value 13 = Indicates the possible presence of a cloud based on the value of the integrated signal parameter (i\_FRir\_intsig) that was not detected directly by the cloud search algorithm. When this occurs, the 40 Hz cloud top height (i\_FRir\_cldtop) is set to a value of 10.0 km.

Value 0 - 12 = Cloud detected by cloud search algorithm with higher numbers indicating a stronger average signal from the region starting at cloud top and extending 500 m below cloud top height.



**Figure 5-52 Full Resolution 1064 Quality Flag**



**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

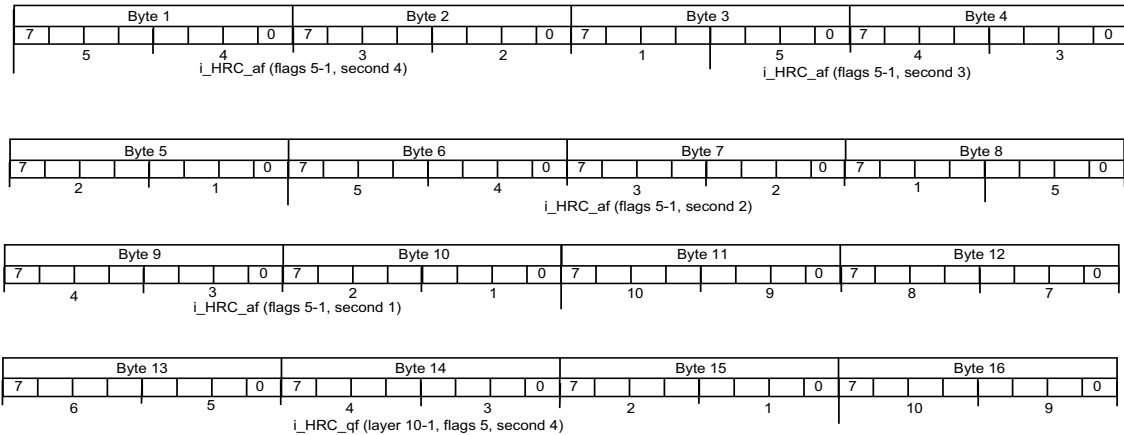
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af = availability flag: Tells how many cloud layers were found (from the 532 channel) at this resolution.  
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

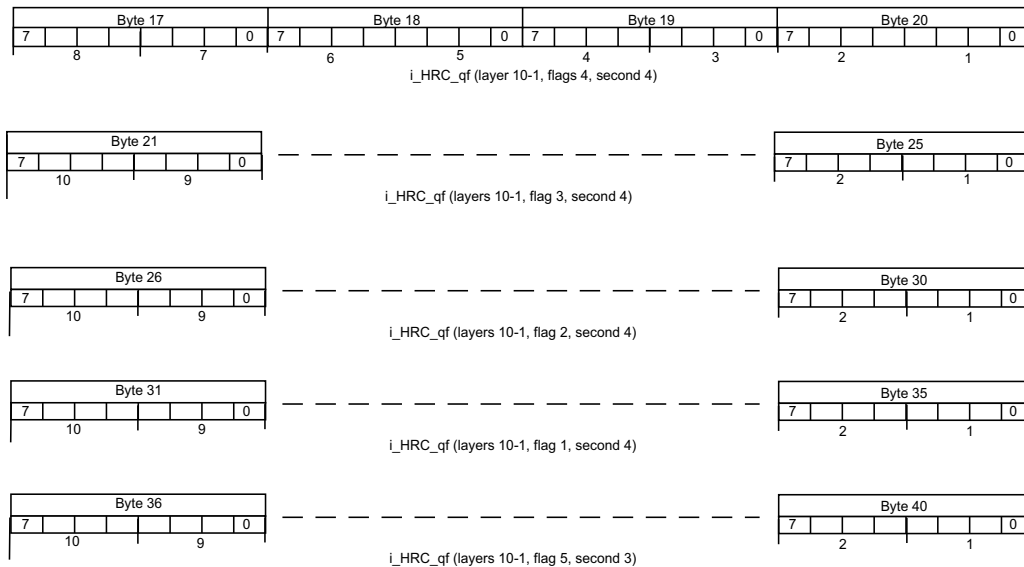
qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser resolution;  
value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

uf = use flag: not used at this time

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight

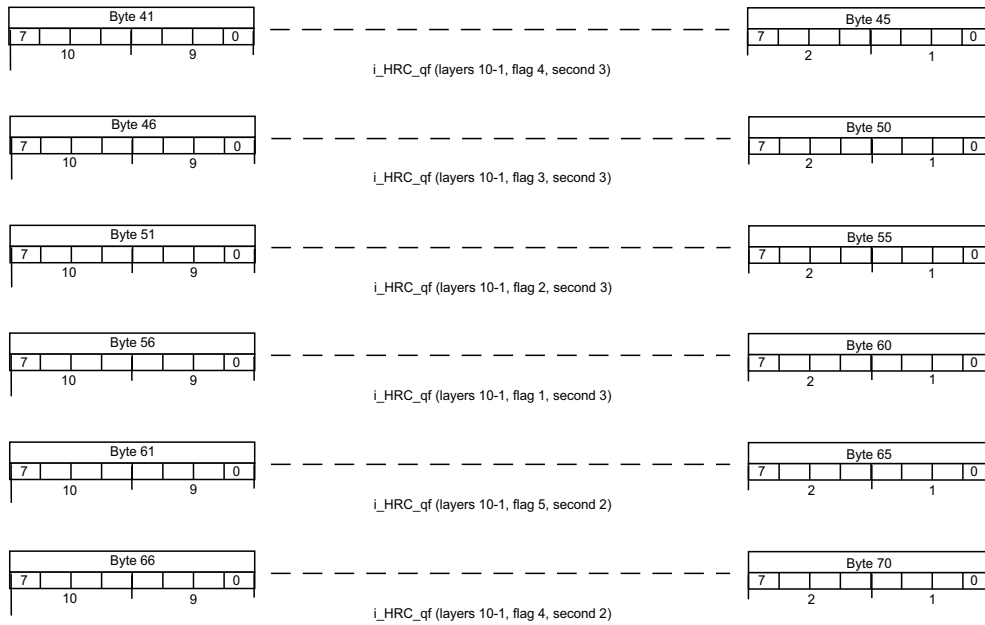
**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

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**Figure 5-53 High Resolution Cloud Layer Flag**

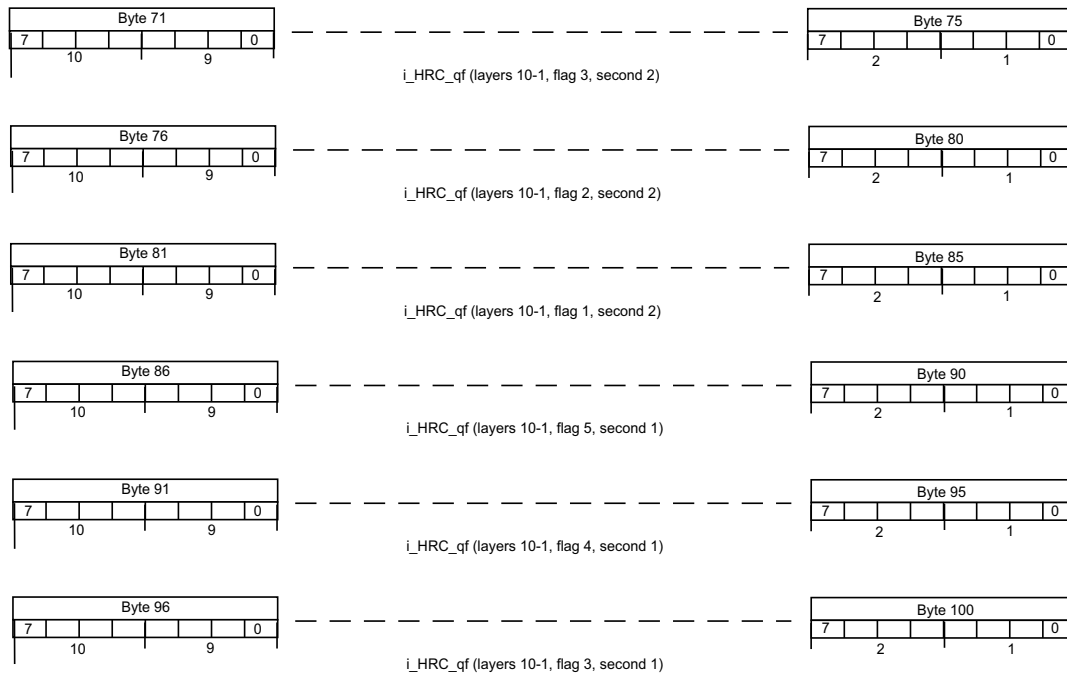
**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

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**Figure 5-53 High Resolution Cloud Layer Flag (Continued)**

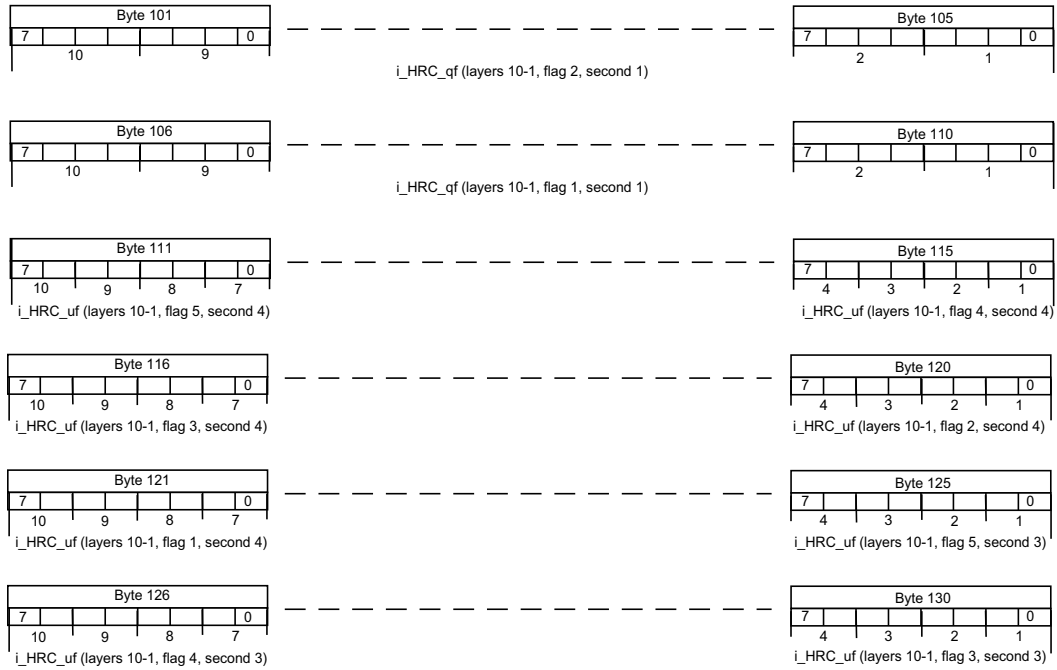
**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

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**Figure 5-53 High Resolution Cloud Layer Flag (Continued)**

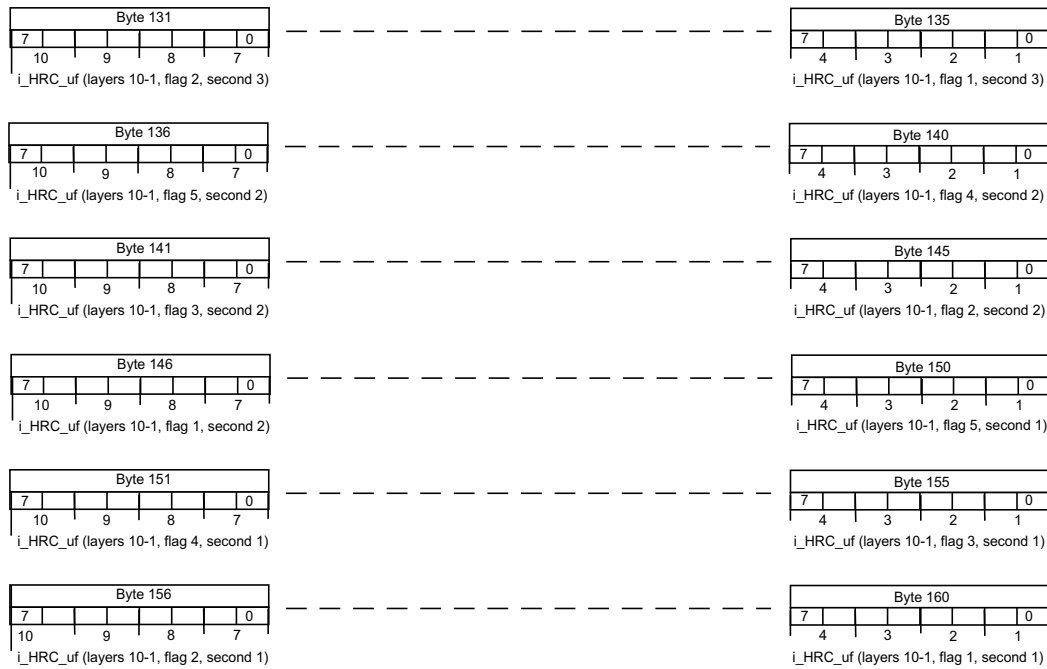
**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

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**Figure 5-53 High Resolution Cloud Layer Flag (Continued)**

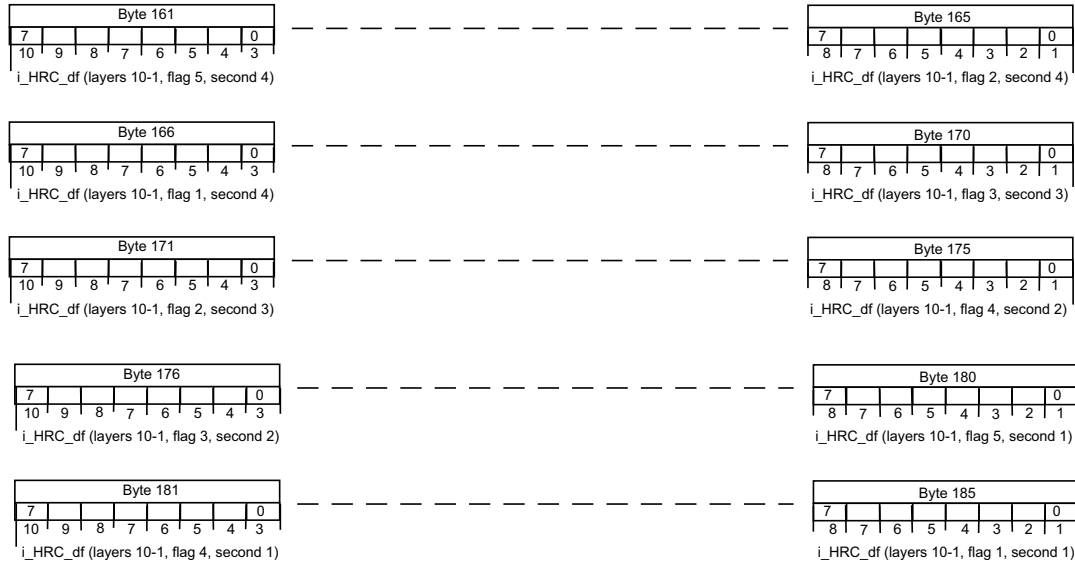
**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag** (4 seconds per record, 5 per second rate)

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**Figure 5-53 High Resolution Cloud Layer Flag (Continued)**

**i\_HRCL\_Flag [GLA09]: High Resolution Cloud Layer Flag (4 seconds per record, 5 per second rate)**

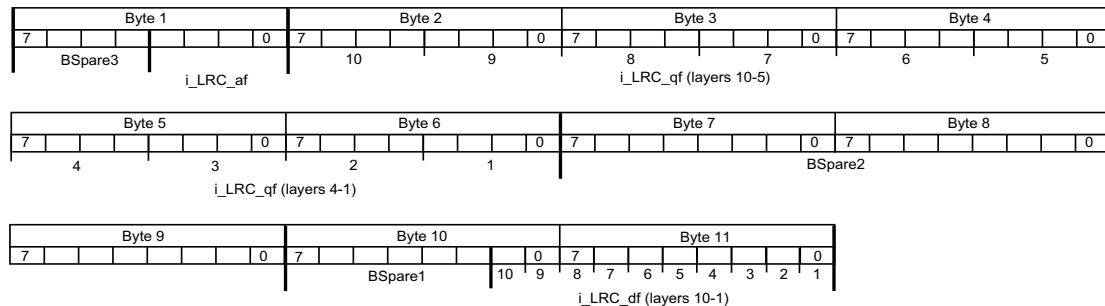
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**Figure 5-53 High Resolution Cloud Layer Flag (Continued)****i\_LRCL\_Flag [GLA09]: Low Resolution Cloud Layer Flag (4 seconds per record, at once per 4 second rate)**

af = availability flag: Tells how many cloud layers were found at this resolution from the 532 nm channel.  
 value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

qf=quality flag: value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser resolution;  
 value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

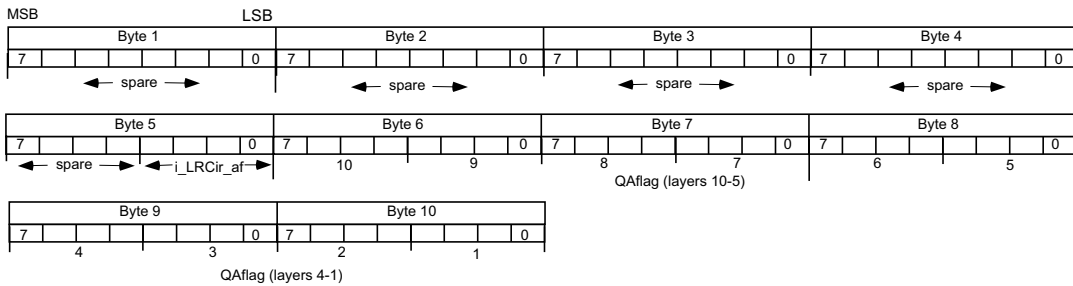
df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight

**Figure 5-54 Low Resolution Cloud Layer Flag**

**i\_LRir\_QAflag [GLA09]:** Low Resolution 1064 Quality Flag (once per 4 seconds rate)

af = availability flag: It provides the number of cloud layers determined from the 1064 nm data.  
value 0 = layers searched for but not detected; value 15 = cloud layers not searched for.

QAflag = quality flag: value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for but not detected; values 1-14 indicate increasing confidence of good cloud retrieval (value 1 = least confidence, value 14 = greatest confidence).



### Figure 5-55 Low Resolution 1064 Quality Flag

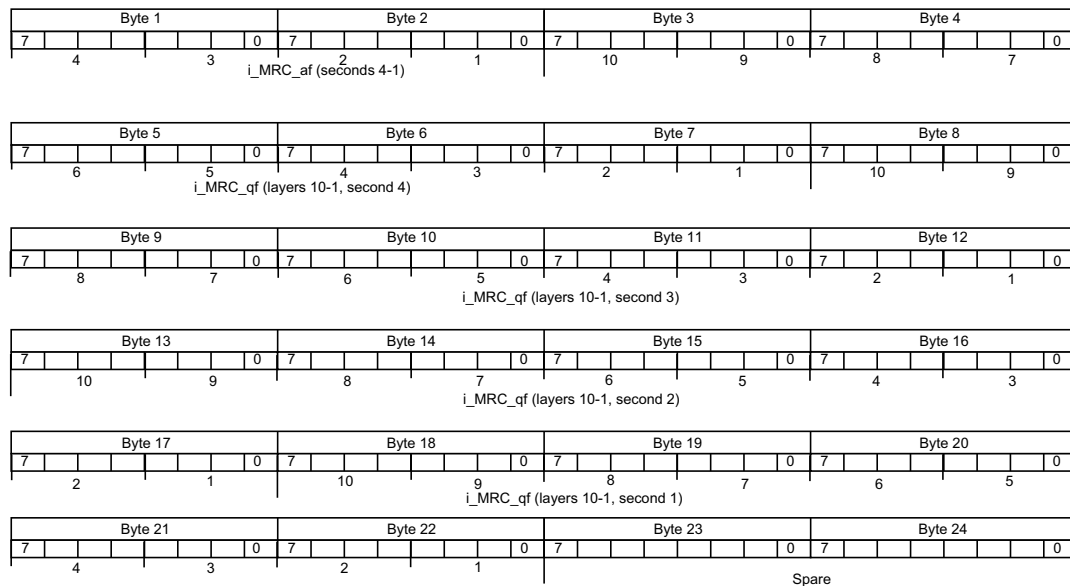
**i\_MRCL\_Flag [GLA09]: Medium Resolution Cloud Layer Flag** (4 seconds per record, at once per second rate)

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af = availability flag: Tells how many cloud layers were found at this resolution from the 532 nm channel.  
value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for, but not detected

qf=quality flag; value 15 = cloud layers were not searched for - either bad data or cloud layers were not found at a coarser resolution; value 1 = low chance of being a cloud; value 2 = moderate; value 3 = high; value 4 = no doubt -- based upon noise-to-signal and geometric thickness evaluation; Value 14 = height of bottom of lowest detected layer in profile very uncertain because ground signal was not detected.

df = diurnal flag: This tells whether a given layer would be detected during normal daylight conditions. value 0 = layer would not have been detected in typical daytime background; value 1 = layer would have been detected in daylight



**Figure 5-56 Medium Resolution Cloud Layer Flag**

i\_MRCL\_Flag [GLA09]: Medium Resolution Cloud Layer Flag (4 seconds per record, at once per second rate) Page 2 of 2

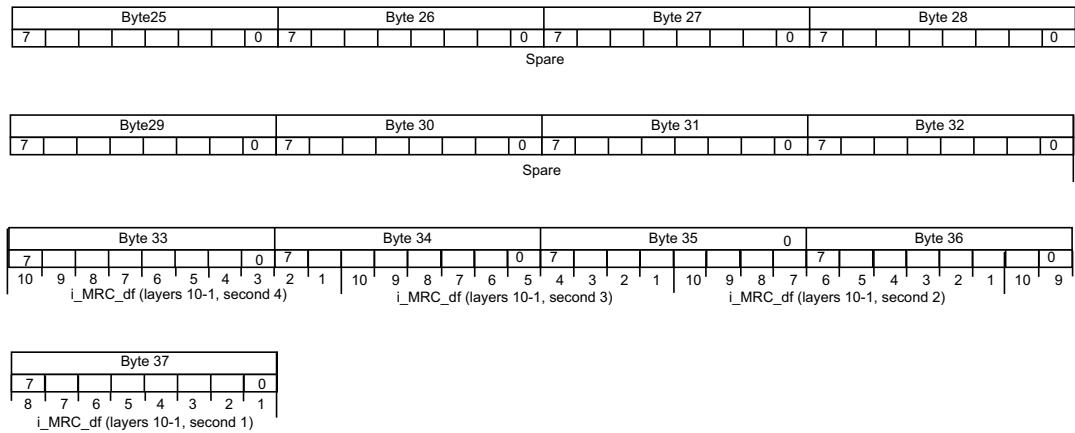


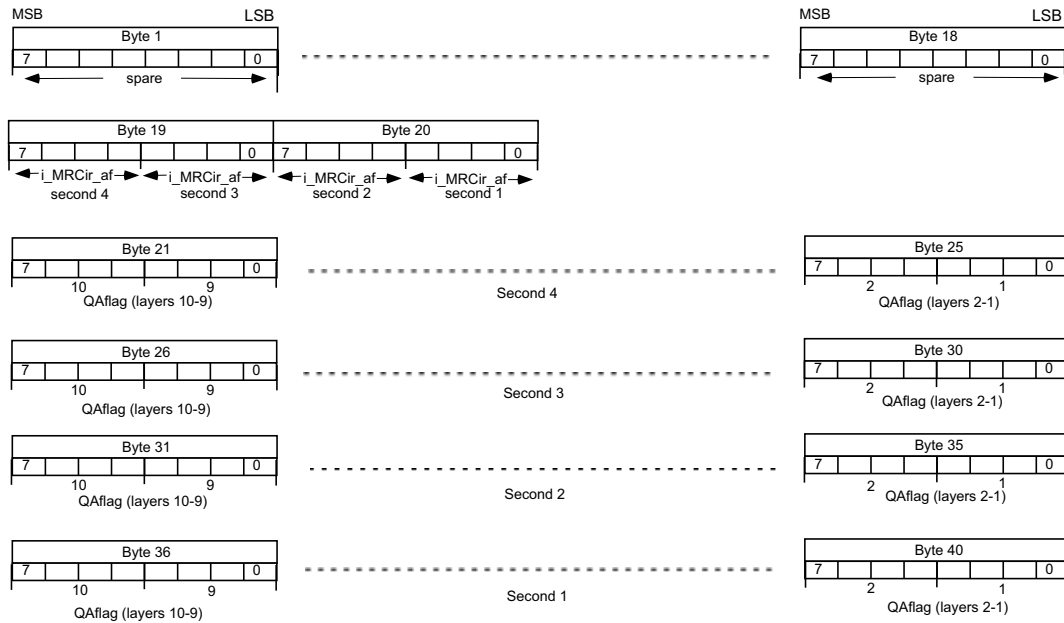
Figure 5-56 Medium Resolution Cloud Layer Flag (Continued)



**i\_MRir\_QAflag [GLA09, 11]: Medium Resolution 1064 Quality Flag** (4 seconds per record, at once per second rate)

af = availability flag: It provides the number of cloud layers determined from the 1064 nm data.  
value 0 = layers searched for but not detected; value 15 = cloud layers not searched for.

QAflag = quality flag: value 15 = cloud layers were not searched for; value 0 = cloud layers were searched for but not detected; values 1-14 indicate increasing confidence of good cloud retrieval (value 1 = least confidence, value 14 = greatest confidence).

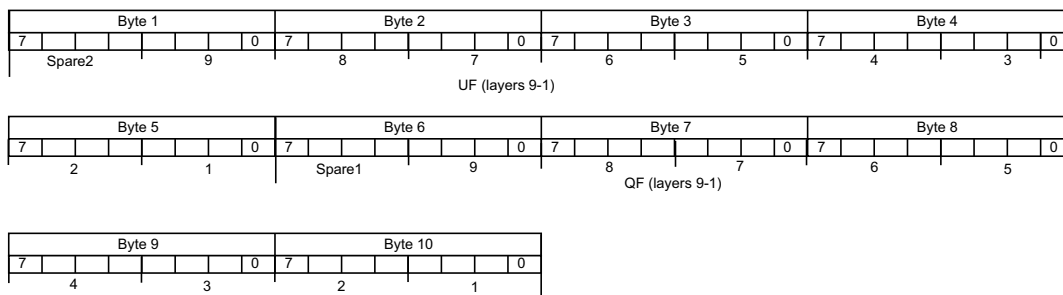


**Figure 5-57 Medium Resolution 1064 Quality Flag**

**i\_aer4\_bs\_flag [GLA10]: Aerosol Backscatter Flag** (once per 4 sec., up to 9 layers/record)

(QF = Quality Flag; UF = Use Flag)

The layers shown below are ordered as follows. Layer 9 corresponds to the lowest layer in the atmosphere (the PBL). Layers 8-4 are for the elevated aerosol layers below 20 km, with 8 the lowest and 4 the highest in altitude. Layers 3 - 1 are for elevated aerosol above 20 km again with 3 the lowest and 1 the highest. For example if there were two elevated aerosol layers and the PBL detected, then the flags would be set for layers 9 (PBL), 4 and 5. In this case layer 4 is the highest elevated aerosol layer found.

**Layer Use Flag Values**

a) For backscatter cross section, the use flag gives saturation status as follows:

**Use FLAG SATURATION STATUS**

- 0 = no saturation detected
- 1 = one or two bins were saturated with 1064 nm conversion performed
- 2 = at least three bins were saturated with 1064 nm conversion performed
- 3 = at least one but less than four bins were saturated with no conversion performed
- 4 = four or more bins were saturated with no conversion performed
- 15 = invalid

**Quality Flag Values**

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to calculate error

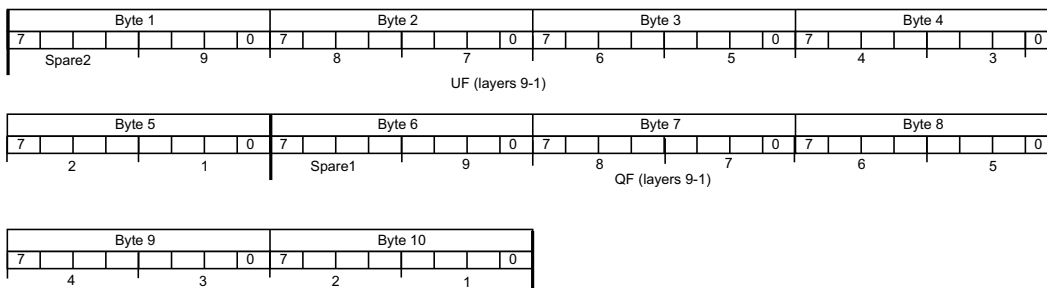
**Figure 5-58 Aerosol Backscatter Flag**

**i\_aer4\_ext\_flag [GLA10]: Aerosol Extinction Flag** (once per 4 sec., up to 9 layers/record)

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(QF = Quality Flag; UF = Use Flag)

The layers shown below are ordered as follows. Layer 9 corresponds to the lowest layer in the atmosphere (the PBL). Layers 8-4 are the for the elevated aerosol layers below 20 km, with 8 the lowest and 4 the highest in altitude. Layers 3 - 1 are for elevated aerosol above 20 km again with 3 the lowest and 1 the highest. For example if there were two elevated aerosol layers and the PBL detected, then the flags would be set for layers 9 (PBL), 4 and 5. In this case layer 4 is the highest elevated aerosol layer found.



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**Layer Use Flag Values**

a) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Aerosol: (based on S ratio default index, PSC flag, and tropopause height)

Use Flag Meaning

- 00 = PBL generic (all PBL indices not mentioned below)
- 01 = PBL maritime (index 4)
- 02 = PBL continental ice (index 7)
- 03 = PBL continental haze (index 11)
- 04 = PBL Saharan dust (index 12)
- 05 = PBL desert (index 13)
- 06 = PBL smoke (indices 15,3)
- 07 = TROP generic (all TROP indices not mentioned below)
- 08 = TROP volcanic (index 3)
- 09 = TROP continental haze (index 11)
- 10 = TROP Saharan dust (index 12)
- 11 = TROP smoke (index 15)
- 12 = STRATO aerosol (any non-PSC layer whose top is > tropopause)
- 13 = PSC type I (PSC with rh less than or equal to 95%)
- 14 = PSC type II (PSC with rh greater than 95%)
- 15 = invalid

**Quality Flag Values**

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to calculate error

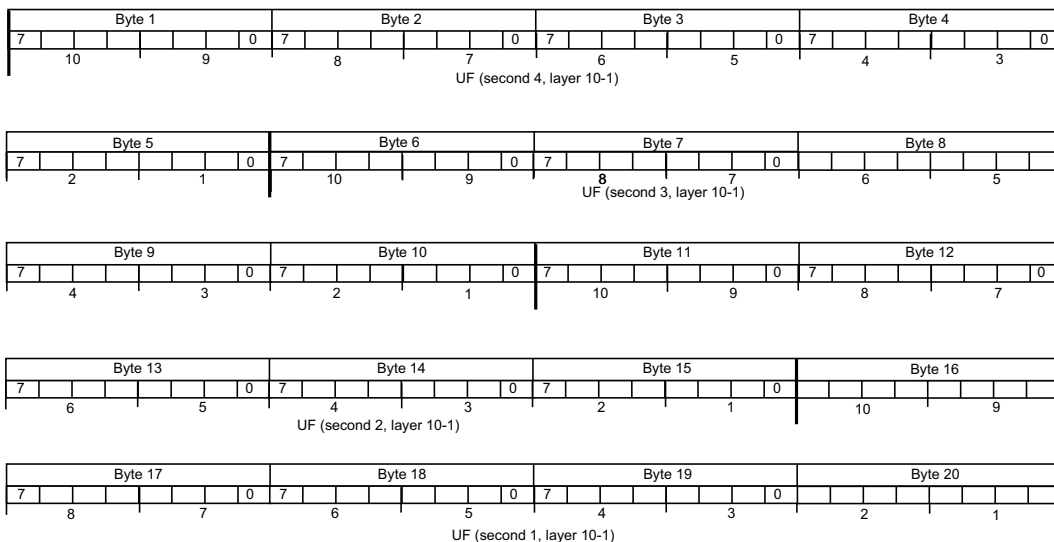
**Figure 5-59 Aerosol Extinction Flag**

**i\_cld1\_bs\_flag [GLA10]: Cloud Backscatter Flag** (4 sec/records, up to 10 layers/sec.)

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(QF = Quality Flag; UF = Use Flag)

The layers shown below are ordered as follows. Layer 1 is the highest in the atmosphere and layer 10 is the lowest.  
For example if 3 cloud layers were detected then the flags corresponding to those layers would be found in layers 1, 2 and 3 (from highest to lowest cloud layer).

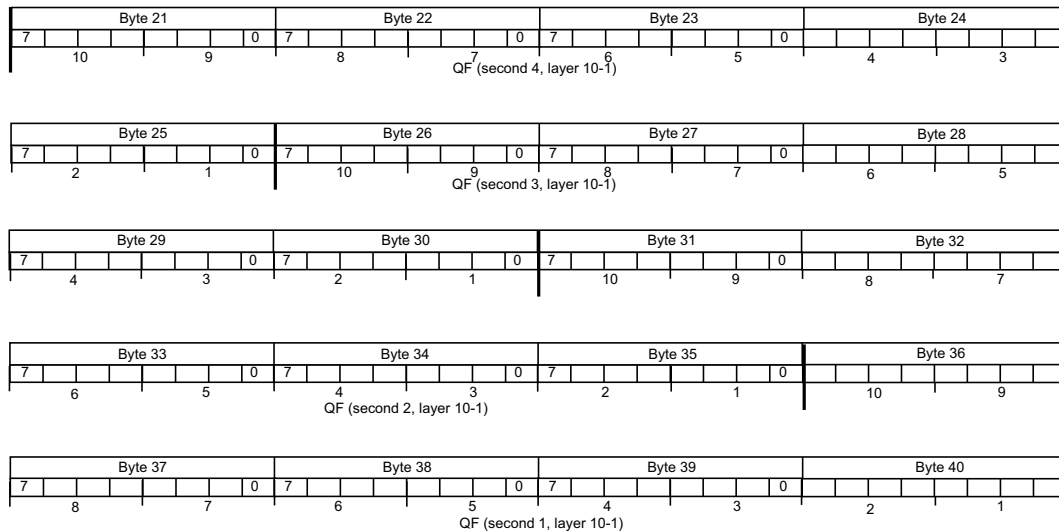


**Figure 5-60 Cloud Backscatter Flag**

**i\_cld1\_bs\_flag [GLA10]: Cloud Backscatter Flag** (4 sec/records, up to 10 layers/sec.)

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(QF = Quality Flag; UF = Use Flag)



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#### Layer Use Flag Values

a) For backscatter cross section, the use flag gives saturation status as follows:

#### Use FLAG SATURATION STATUS

- 0 = no saturation detected
- 1 = one or two bins were saturated with 1064 nm conversion performed
- 2 = at least three bins were saturated with 1064 nm conversion performed
- 3 = at least one but less than four bins were saturated with no conversion performed
- 4 = four or more bins were saturated with no conversion performed
- 15 = invalid

#### Quality Flag Values

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to calculate error

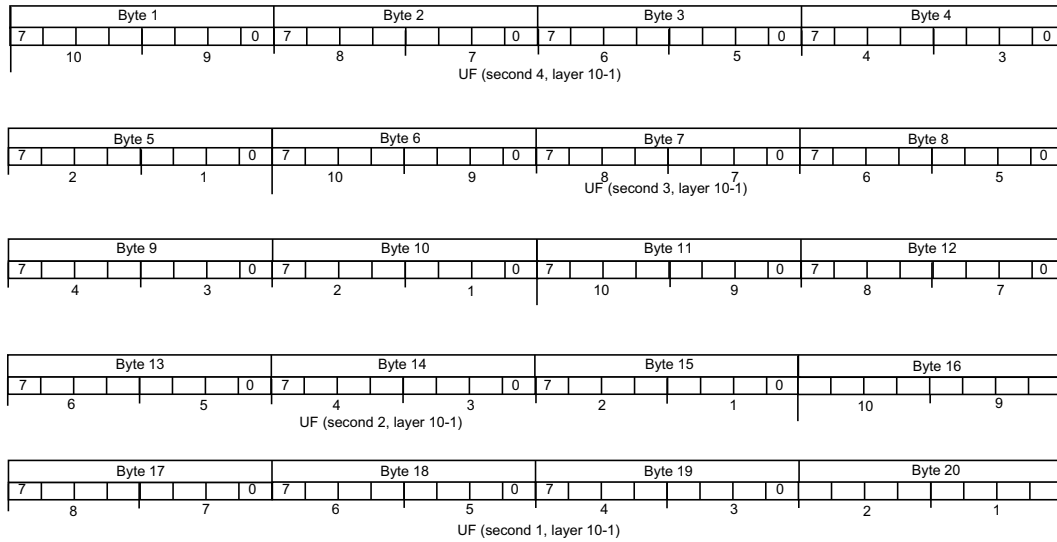
**Figure 5-60 Cloud Backscatter Flag (Continued)**

**i\_cld1\_ext\_flag [GLA10]: Cloud Extinction Flag** (4 sec/records, up to 10 layers/sec.)

Page 1 of 3

(QF = Quality Flag; UF = Use Flag)

The layers shown below are ordered as follows. Layer 1 is the highest in the atmosphere and layer 10 is the lowest.  
For example if 3 cloud layers were detected then the flags corresponding to those layers would be found in layers 1, 2 and 3 (from highest to lowest cloud layer).

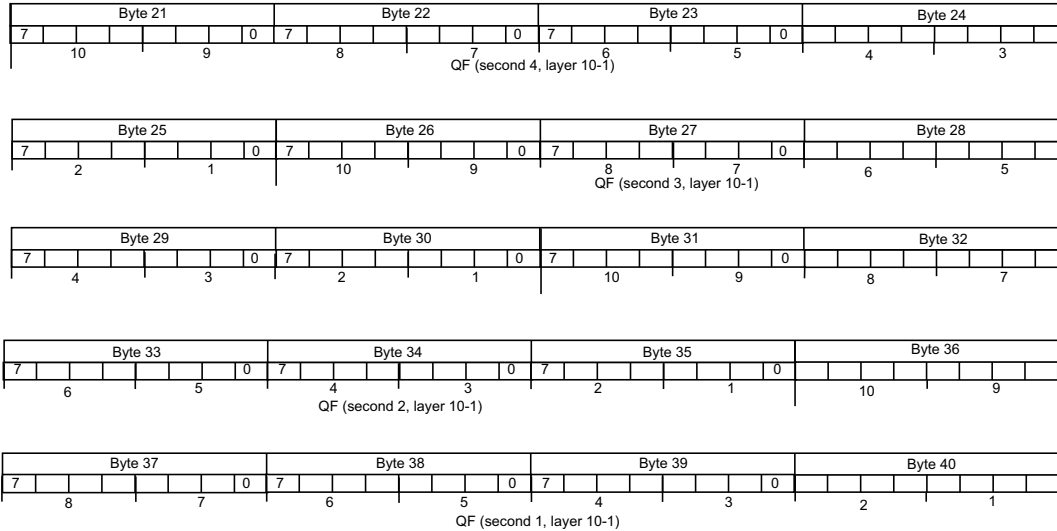


**Figure 5-61 Cloud Extinction Flag**

**i\_cld1\_ext\_flag [GLA10]: Cloud Extinction Flag** (4 sec/records, up to 10 layers/sec.)

Page 2 of 3

(QF = Quality Flag; UF = Use Flag)



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#### Layer Use Flag Values

a) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Cloud: {based on average cloud temperature, water cloud is warmer than -13 C}

Use Flag Meaning

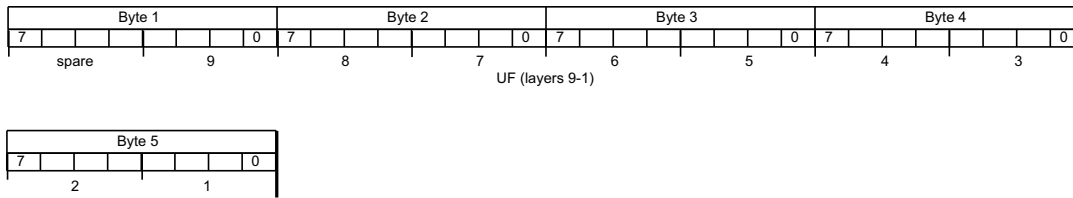
- 00 = less than or equal to -75.0 C
- 01 = -75.0 through -68.5
- 02 = -68.5 through -62.0
- 03 = -62.0 through -55.5
- 04 = -55.5 through -49.0
- 05 = -49.0 through -32.5
- 06 = -32.5 through -26.0
- 07 = -26.0 through -19.5
- 08 = -19.5 through -13.0
- 09 = -13.0 through -6.5
- 10 = -6.5 through 0.0
- 11 = 0.0 through 6.5
- 12 = 6.5 through 13.0
- 13 = 13.0 through 19.5
- 14 = greater than 19.5 C
- 15 = invalid

#### Quality Flag Values

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to calculate error

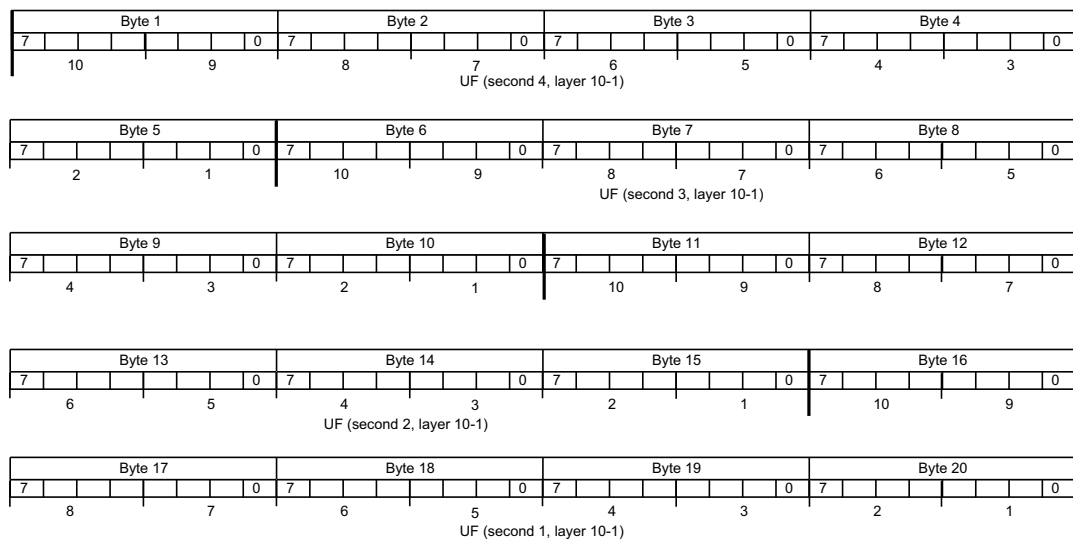
**Figure 5-61 Cloud Extinction Flag (Continued)**

**i\_aer4\_sval\_uf [GLA10]: Aerosol True S Values Use Flag** (once per 4 sec., up to 9 layers/record)



**Figure 5-62 Aerosol True S Values Use Flag**

**i\_cld1\_sval\_uf [GLA10]: Cloud True S Values Use Flag** (4 sec/records, up to 10 layers/sec.)



**Figure 5-63 Cloud True S Values Use Flag**



**i\_aer4\_flag [GLA11]: Aerosol Optical Depth** (4 sec. per record, at once per 4 second rate)

(QF = Quality Flag; UF = Use Flag)

The layers shown below are ordered as follows. Layers 8-4 are the for the elevated aerosol layers below 20 km, with 8 the lowest and 4 the highest in altitude. Layers 3 - 1 are for elevated aerosol above 20 km again with 3 the lowest and 1 the highest. For example if there were two elevated aerosol layers detected which were below 20 km, then the flags would be set for layers 8 and 7. In this case layer 7 is the highest elevated aerosol layer found. The values for layers 1-3 would be invalid.

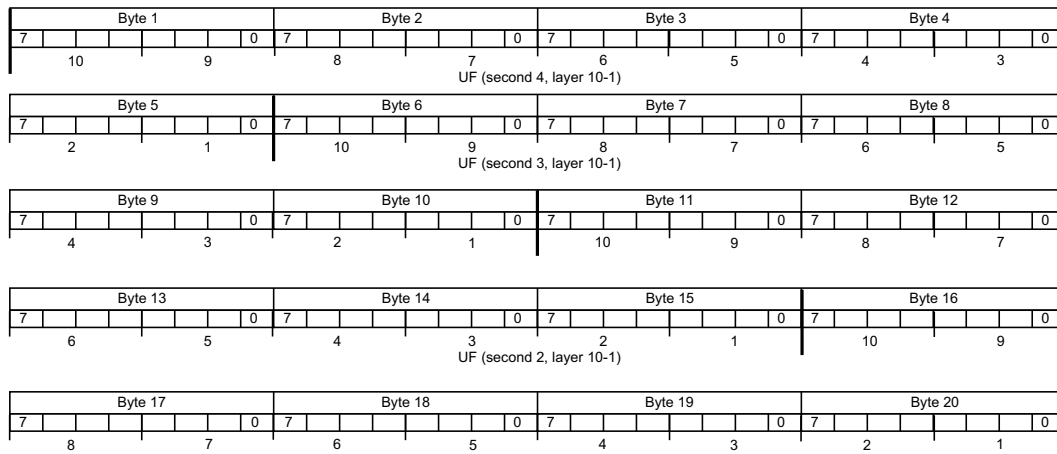
Byte 1				Byte 2				Byte 3				Byte 4			
7			0	7			0	7			0	7			0
UF (layer 8)				UF (layer 7)				UF (layer 6)				UF (layer 5)			

**i\_cld1\_flag [GLA11]: Cloud Optical Depth** (4 sec. per record, at once per second rate)

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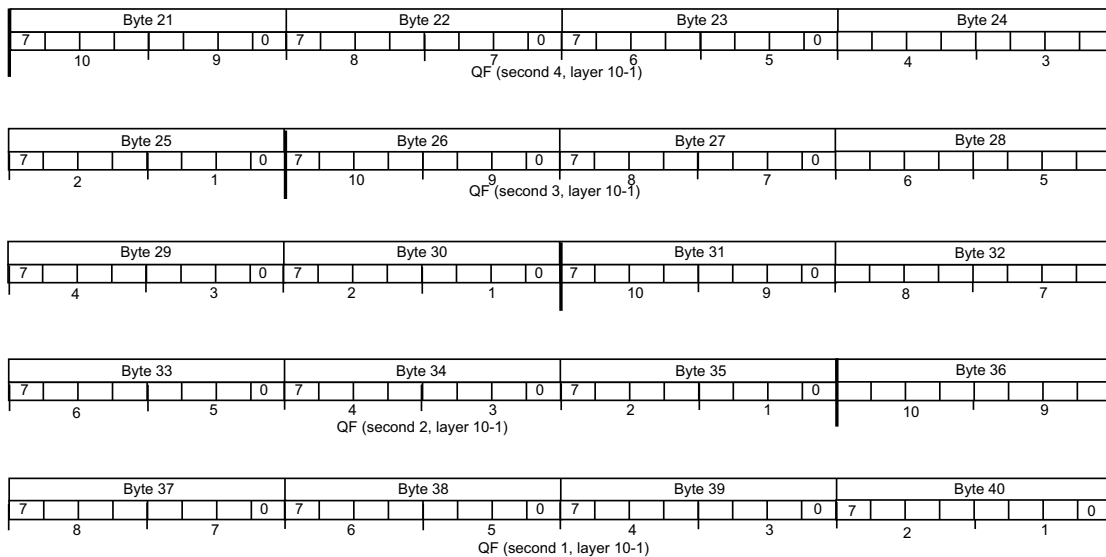
(QF = Quality Flag; UF = Use Flag; see Page 3 for Value Descriptions)

The layers shown below are ordered as follows. Layer 1 is the highest in the atmosphere and layer 10 is the lowest.  
For example if 3 cloud layers were detected then the flags corresponding to those layers would be found in layers 1, 2 and 3 (from highest to lowest cloud layer).

**i\_cld1\_flag [GLA11]: Cloud Optical Depth** (4 sec. per record, at once per second rate)

Page 2 of 3

(QF = Quality Flag; UF = Use Flag; see Page 3 for Value Descriptions)

**Figure 5-65 Cloud Optical Depth**

**i\_cld1\_flag [GLA11]: Cloud Optical Depth** (4 sec. per record, at once per second rate)

Page 3 of 3

(QF = Quality Flag; UF = Use Flag)

**Layer Use Flag Values**

a) for extinction cross section and layer optical depth, the use flag designates layer type category as follows:

Cloud: {based on average cloud temperature, water cloud is warmer than -13 C}

- Use Flag Meaning
- 00 = less than or equal to -75.0 C
  - 01 = -75.0 through -68.5
  - 02 = -68.5 through -62.0
  - 03 = -62.0 through -55.5
  - 04 = -55.5 through -49.0
  - 05 = -49.0 through -32.5
  - 06 = -32.5 through -26.0
  - 07 = -26.0 through -19.5
  - 08 = -19.5 through -13.0
  - 09 = -13.0 through -6.5
  - 10 = -6.5 through 0.0
  - 11 = 0.0 through 6.5
  - 12 = 6.5 through 13.0
  - 13 = 13.0 through 19.5
  - 14 = greater than 19.5 C
  - 15 = invalid

**Quality Flag Values**

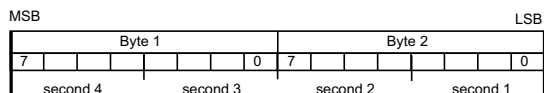
- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to calculate error

**Figure 5-65 Cloud Optical Depth (Continued)**

**i\_cld1\_mswf [GLA11]: Multiple Scattering Warning Flag** (4 sec. per record, at once per second rate)

4 bit set of values;

- 0 = < 0.010
- 1 = 0.010 - 0.030
- 2 = 0.030 - 0.060
- 3 = 0.060 - 0.100
- 4 = 0.100 - 0.150
- 5 = 0.150 - 0.225
- 6 = 0.225 - 0.300
- 7 = 0.300 - 0.400
- 8 = 0.400 - 0.500
- 9 = 0.500 - 0.670
- 10 = 0.670 - 0.900
- 11 = 0.900 - 1.200
- 12 = 1.200 - 1.600
- 13 = 1.600 - 2.000
- 14 = > 2.000
- 15 = Invalid

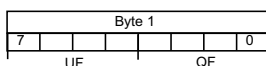


Note: A warning flag value of 15 will be the default whenever no 532nm signal is available (as when the 532 laser energy is < 4 mJ during daytime). To distinguish this case from that of optically thick clouds, one must check the number of layers. If there were zero layers reported, but the MSWF is 15, then the cause is the lack of useable 532 data. If the number of layers is > 0 and the MSWF is 15, then the cause is total extinction of the lidar beam (this happens for clouds of optical depth > about 3).

A warning flag of '0' is a very good indicator of no layers or a layer so thin it won't cause any altimetry range delays.

**Figure 5-66 Multiple Scattering Warning Flag****i\_pbl4\_flag [GLA11]: PBL Optical Depth** (4 sec. per record, at once per 4 second rate)

(QF = Quality Flag; UF = Use Flag)

**Layer Use Flag Values**

Use Flag Meaning for PBL

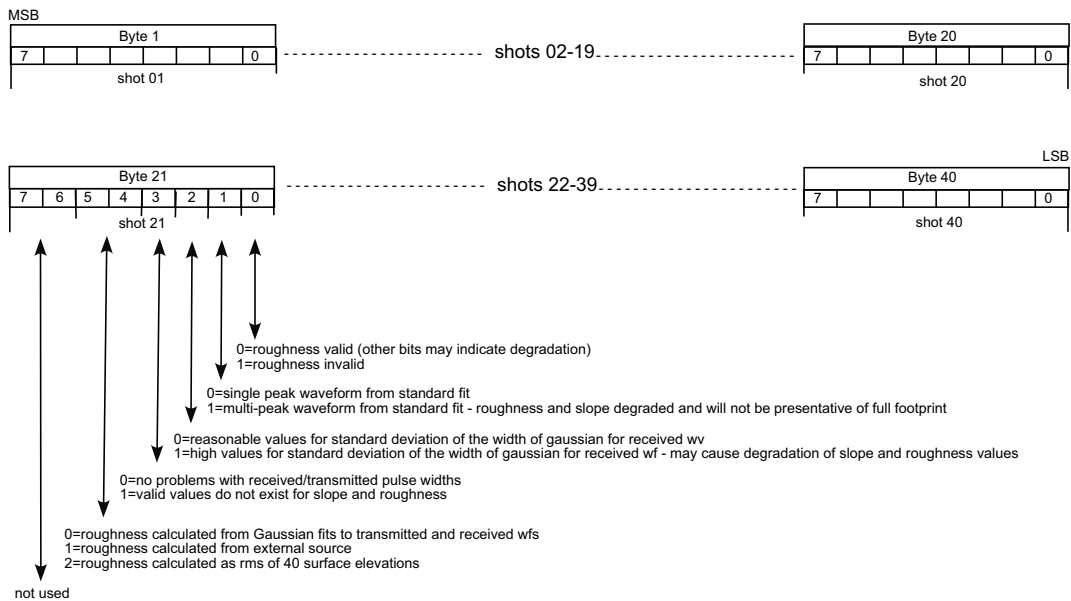
- 0 - none (use your default Sa)
- 1 - sulfate+carbon (67.5 sr)
- 2 - carbon (62.0 sr)
- 3 - salt+dust (32.5 sr)
- 4 - salt (28.5 sr)
- 5 - sulfate (60.0 sr)
- 6 - dust+carbon (58.1 sr)
- 7 - salt+dust+sulfate (47.2 sr)
- 8 - salt+carbon (49.1 sr)
- 9 - salt+sulfate (47.9 sr)
- 10 - dust (42.5 sr)
- 11 - salt+dust+carbon (48.2 sr)
- 12 - dust+sulfate (56.5 sr)
- 13 - salt+carbon+sulfate (53.3 sr)
- 14 - dust+carbon+sulfate (58.9 sr)
- 15 - all (52.3 sr)

**Quality Flag Values**

- 0 = 0-5 % Error
- 1 = 5-10 % Error
- 2 = 10-15 % Error
- 3 = 15-20 % Error
- 4 = 20-25 % Error
- 5 = 25-30 % Error
- 6 = 30-35 % Error
- 7 = 35-40 % Error
- 8 = 40-45 % Error
- 9 = 45-50 % Error
- 10 = 50-55 % Error
- 11 = 55-60 % Error
- 12 = 60-65 % Error
- 13 = 65-70 % Error
- 14 = 70 and greater % Error
- 15 = Unable to process

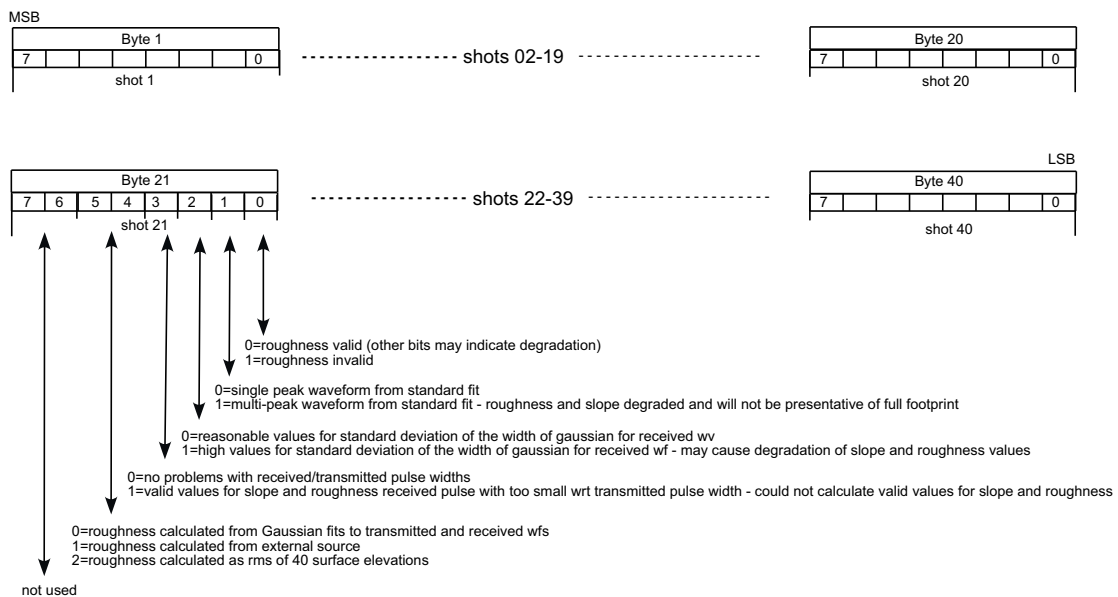
**Figure 5-67 PBL Optical Depth**

**i\_SiRufQF [1/sec for GLA13]: Sea Ice Roughness Quality Flag;** One byte per shot data quality flag



**Figure 5-68 Sea Ice Roughness Quality Flag**

**i\_OcRMSqf [1/sec for GLA15]: Ocean RMS Roughness Quality Flag;** one byte per shot quality flag



**Figure 5-69 Ocean RMS Roughness Quality Flag**

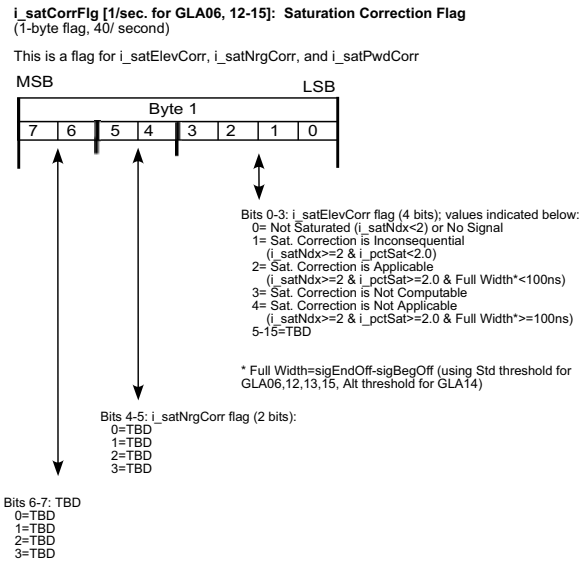


Figure 5-70 Saturation Correction Flag

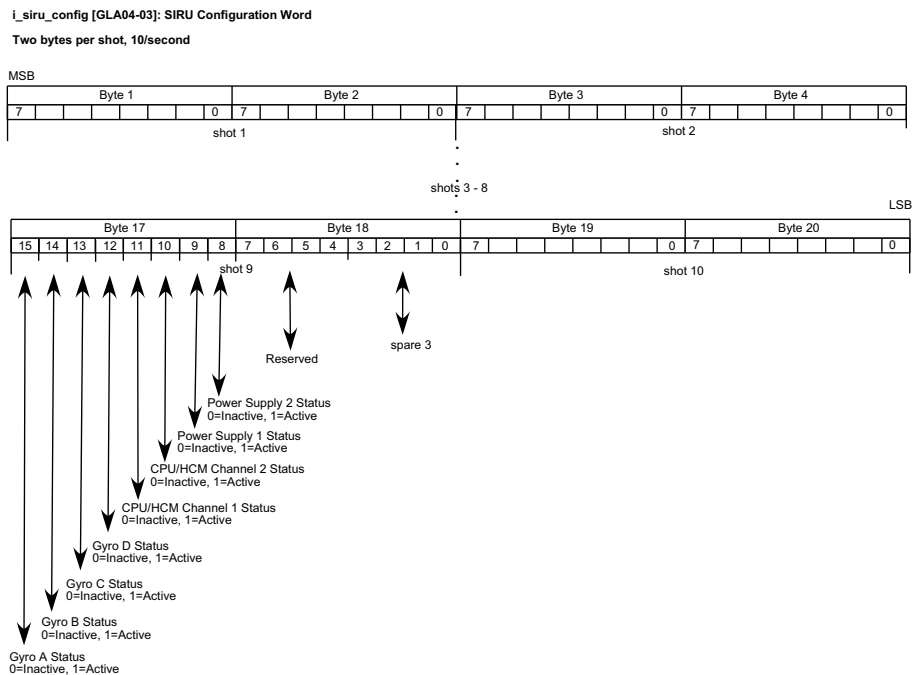


Figure 5-71 SIRU Configuration Word

# Abbreviations & Acronyms

A2P	Algorithm-to-Product Conversion
ALT	Altimeter or Altimetry, also designation for the EOS-Altimeter spacecraft series
ANCxx	GLAS Ancillary Data Files
APID	GLAS Level-0 Data file
ATBD	Algorithm Theoretical Basis Document
ATM	Atmosphere
CCB	Change Control Board
ClearCase	GSAS version tracking software
CR	Change Request
DAAC	Distributed Active Archive Center
DEM	Digital Elevation Model
DFD	Data Flow Diagram
DLT	Digital Linear Tape
EDOS	EOS Data and Operations System
EDS	Expedited Data Set
ELEV	Elevation
EOC	EOS Operating Center
EOS	NASA Earth Observing System Mission Program
EOSDIS	Earth Observing System Data and Information System
GB	Gigabyte
GDS	GLAS Ground Data System
GLAS	Geoscience Laser Altimeter System instrument or investigation
GLAxx	GLAS Science Data Product Files
GLOP	GLAS Level-0 PGE (correctly called GLAS_L0proc)
TBD	to be determined, to be done, or to be developed





# Glossary

aggregate	A collection, assemblage, or grouping of distinct data parts together to make a whole. It is generally used to indicate the grouping of GLAS data items, arrays, elements, and EOS parameters into a data record. For example, the collection of Level 1B EOS Data Parameters gathered to form a one-second Level 1B data record. It could be used to represent groupings of various GLAS data entities such as data items aggregated as an array, data items and arrays aggregated into a GLAS Data Element, GLAS Data Elements aggregated as an EOS Data Parameter, or EOS Data Parameters aggregated into a Data Product record.
array	An ordered arrangement of homogenous data items that may either be synchronous or asynchronous. An array of data items usually implies the ability to access individual data items or members of the array by an index. An array of GLAS data items might represent the three coordinates of a georeference location, a collection of values at a rate, or a collection of values describing an altimeter waveform.
file	A collection of data stored as records and terminated by a physical or logical end-of-file (EOF) marker. The term usually applies to the collection within a storage device or storage media such as a disk file or a tape file.
header	A text and/or binary label or information record, record set, or block, prefacing a data record, record set, or a file. A header usually contains identifying or descriptive information, and may sometimes be embedded within a record rather than attached as a prefix.
item	Specifically, a data item. A discrete, non-decomposable unit of data, usually a single word or value in a data record, or a single value from a data array. The representation of a single GLAS data value within a data array or a GLAS Data Element.
label	The text and/or binary information records, record set, block, header, or headers prefacing a data file or linked to a data file sufficient to form a labeled data product. A label may consist of a single header as well as multiple headers and markers depending on the defining authority.
Level 0	The level designation applied to an EOS data product that consists of raw instrument data, recorded at the original resolution, in time order, with any duplicate or redundant data packets removed.
Level 1A	The level designation applied to an EOS data product that consists of reconstructed, unprocessed Level 0 instrument data, recorded at the full resolution with time referenced data records, in time order. The data are annotated with ancillary information including radiometric and geometric calibration coefficients, and georeferencing parameter data (i.e., ephemeris data). The included, computed coefficients and parameter data have not however been applied to correct the Level 0 instrument data contents.
Level 1B	The level designation applied to an EOS data product that consists of Level 1A data that have been radiometrically corrected, processed from raw data into sensor data units, and have been geolocated according to applied georeferencing data.

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Level 2	The level designation applied to an EOS data product that consists of derived geophysical data values, recorded at the same resolution, time order, and geo-reference location as the Level 1A or Level 1B data.
Level 3	The level designation applied to an EOS data product that consists of geophysical data values derived from Level 1 or Level 2 data, recorded at a temporally or spatially resampled resolution.
Level 4	The level designation applied to an EOS data product that consists of data from modeled output or resultant analysis of lower level data that are not directly derived by the GLAS instrument and supplemental sensors.
metadata	The textual information supplied as supplemental, descriptive information to a data product. It may consist of fixed or variable length records of ASCII data describing files, records, parameters, elements, items, formats, etc., that may serve as catalog, data base, keyword/value, header, or label data. This data may be parsable and searchable by some tool or utility program.
orbit revolution	The passage of time and spacecraft travel signifying a complete journey around a celestial or terrestrial body. For GLAS and the EOS ICESat spacecraft each orbit revolution count starts at the time when the spacecraft is on the equator traveling toward the North Pole, continues through the equator crossing as the spacecraft ground track moves toward the South Pole, and terminates when the spacecraft has reached the equator moving northward from the South Polar region.
parameter	Specifically, an EOS Data Parameter. This is a defining, controlling, or constraining data unit associated with a EOS science community approved algorithm. It is identified by an EOS Parameter Number and Parameter Name. An EOS Data Parameter within the GLAS Data Product is composed of one or more GLAS Data Elements.
pass	A sub-segment of an orbit, it may consist of the ascending or descending portion of an orbit (e.g., a descending pass would consist of the ground track segment beginning with the northernmost point of travel through the following southernmost point of travel), or the segment above or below the equator (e.g., either the northern or southern hemisphere portion of the ground track on any orbit).
product	Specifically, the Data Product or the EOS Data Product. This is implicitly the labeled data product or the data product as produced by software on the DAAC or SCF. A GLAS data product refers to the data file or record collection either prefaced with a product label or standard formatted data label or linked to a product label or standard formatted data label file. Loosely used, it may indicate the entire set of product files contained in a data repository.
record	A specific organization or aggregate of data items. It represents the collection of EOS Data Parameters within a given time interval, such as a one-second data record. It is the first level decomposition of a product file.
Standard Data Product	Specifically, a GLAS Standard Data Product. It represents an EOS ICESat/GLAS Data Product produced on the DAAC or on the SCF. It is routinely produced and is intended to be archived in the EOSDIS data repository for EOS user community-wide access and retrieval.
variable	Usually a reference in a computer program to a storage location.

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